IEI Technology Corp.

MODEL:

WAFER-945GSE

3.5" SBC with Intel® Atom™ Processor with support for VGA and LVDS Displays, Dual PCIe GbE, CF Type II, and SATA

User Manual

Rev. 1.03 - 26 May, 2009

RoHS Lead Free

Revision

Date	Version	Changes
26 May, 2009	1.03	Modified LVDS connector description in Section 4.3.10
12 March, 2009	1.02	Changed model name
8 January, 2009	1.01	Added a warning for using heat sink enclosure on page 92
4 November, 2008	1.00	Initial release

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Manual Conventions

WARNING!

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as “**WARNING**,” both capitalized and bold and is followed by text. The text is the warning message. A warning message is shown below:

WARNING:

This is an example of a warning message. Failure to adhere to warning messages may result in permanent damage to the WAFER-945GSE or personal injury to the user. Please take warning messages seriously.

CAUTION!

Cautionary messages should also be heeded to help reduce the chance of losing data or damaging the WAFER-945GSE. Cautions are easy to recognize. The word “caution” is written as “**CAUTION**,” both capitalized and bold and is followed. The italicized text is the cautionary message. A caution message is shown below:

CAUTION:

This is an example of a caution message. Failure to adhere to cautions messages may result in permanent damage to the WAFER-945GSE. Please take caution messages seriously.

NOTE:

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes. Notes are easy to recognize. The word “note” is written as “**NOTE**,” both capitalized and bold and is followed by text. The text is the cautionary message. A note message is shown below:

NOTE:

This is an example of a note message. Notes should always be read. Notes contain critical information about the WAFER-945GSE. Please take note messages seriously.

Packing List

NOTE:

If any of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the WAFER-945GSE from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

The items listed below should all be included in the WAFER-945GSE package.

- 1 x WAFER-945GSE Single Board Computer
- 1 x 4-port RS-232 cable (P/N: 32200-025401-RS)
- 2 x SATA Cable (P/N: 32000-062800-RS)
- 1 x KB/MS Cable (P/N: 32000-023800-RS)
- 1 x Audio Cable (P/N: 32000-072100-RS)
- 1 x Enclosure Heatsink
- 1 x Mini Jumper pack
- 1 x Utility CD
- 1 x QIG (Quick Installation Guide)

Images of the above items are shown in **Chapter 3**.

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Chapter

1

Introduction

1.1 Overview

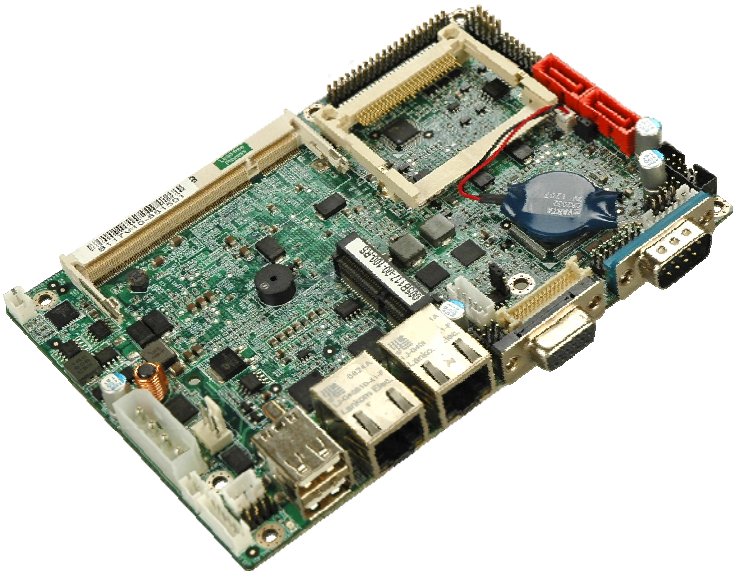


Figure 1-1: WAFER-945GSE

1.1.1 WAFER-945GSE Introduction

The WAFER-945GSE 3.5” motherboards are embedded 45 nm Intel® Atom™ processor platforms. The Intel® Atom™ processor N270 embedded on the WAFER-945GSE has a 1.60 GHz clock speed, a 533 MHz FSB and a 512 KB L2 cache. The WAFER-945GSE also supports one 200-pin 533 MHz 2.0 GB (max.) DDR2 SDRAM SO-DIMM. The board comes with an LVDS connector and supports both 18-bit and 36-bit single channel LVDS screens. The WAFER-945GSE also comes with two PCI Express (PCIe) Gigabit Ethernet (GbE) connectors and a PCIe mini slot on the solder side.

1.2 WAFER-945GSE Overview

1.2.1 WAFER-945GSE Overview Photo

The WAFER-945GSE has a wide variety of peripheral interface connectors. **Figure 1-2** is a labeled photo of the peripheral interface connectors on the WAFER-945GSE.

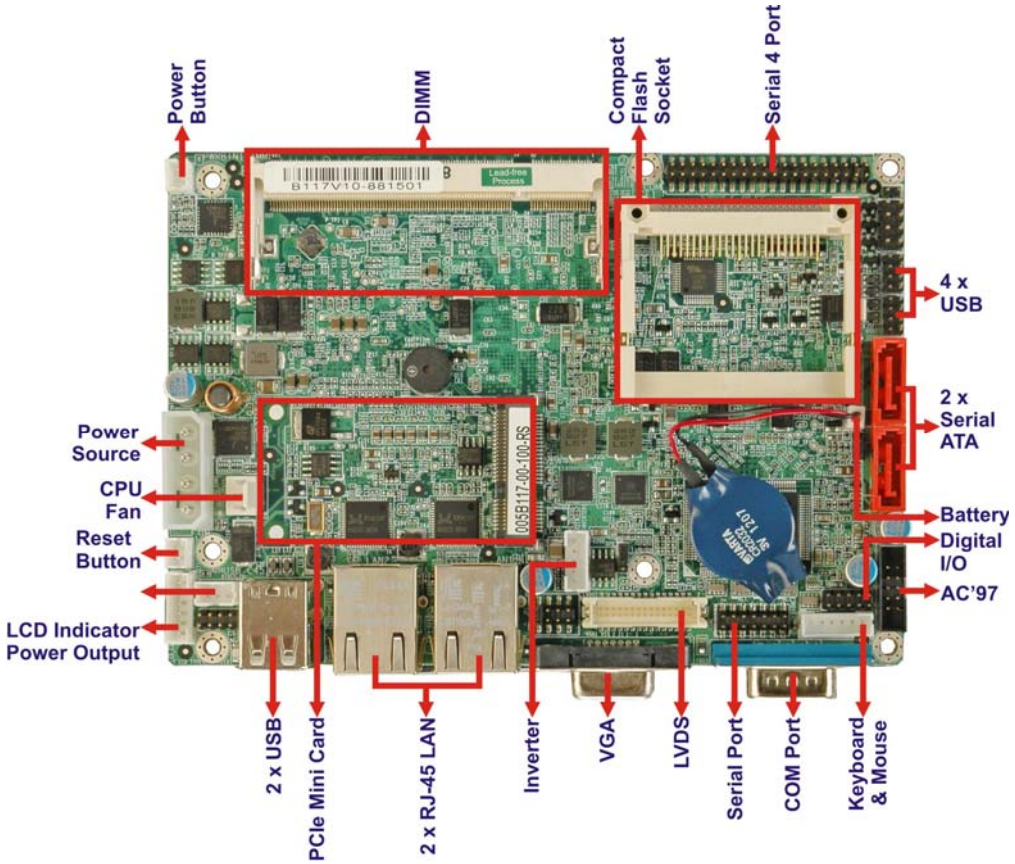


Figure 1-2: WAFER-945GSE Overview [Front View]

1.2.2 WAFER-945GSE Peripheral Connectors and Jumpers

The WAFER-945GSE has the following connectors on-board:

- 1 x ATX power connector
- 1 x ATX enable connector
- 1 x Audio connector
- 1 x Backlight inverter connector
- 1 x CompactFlash® socket
- 1 x Digital input/output (DIO) connector
- 1 x Fan connector
- 1 x Keyboard and mouse connector
- 1 x LED connector
- 1 x LVDS connector
- 1 x PCIe Mini Card slot

- 1 x Power button connector
- 1 x Reset button connector
- 1 x 4-port RS-232 serial port connector
- 1 x RS-232/422/485 serial port connector
- 2 x Serial ATA (SATA) drive connectors
- 2 x USB 2.0 connectors (supports four USB 2.0 devices)

The WAFER-945GSE has the following external peripheral interface connectors on the board rear panel.

- 2 x Ethernet connectors
- 1 x Serial port connector
- 2 x USB connectors
- 1 x VGA connector

The WAFER-945GSE has the following on-board jumpers:

- AT Power Mode Setting
- Clear CMOS
- CF card setup
- LVDS1 Voltage Selection
- LVDS1 Panel Resolution Selection
- COM2 Port Mode setting

1.2.3 Technical Specifications

WAFER-945GSE technical specifications are listed in **Table 1-1**. See **Chapter 2** for details.

Specification	WAFER-945GSE
Form Factor	3.5”
System CPU	45 nm 1.6 GHz Intel® Atom™ N270
Front Side Bus (FSB)	533 MHz

System Chipset	Northbridge: Intel® 945GSE Southbridge: Intel® ICH7-M
Memory	One 200-pin SO-DIMM socket supports one 400 MHz or 533 MHz 2.0 GB (max.) DDR2 SDRAM SO-DIMM
CompactFlash®	One CompactFlash® Type II socket
Super I/O	ITE IT8718
Display	Intel® Generation 3.5 integrated GFX core (133 MHz) 18-bit dual channel LVDS integrated in Intel® 945GSE Dual-display supported (VGA and LVDS)
BIOS	AMI BIOS label
Audio	Realtek ALC655 AC'97 codec
LAN	Two Realtek RTL8111CP GbE controllers
COM	Five RS-232 serial ports One RS-232/422/485 serial port
USB2.0	Six USB 2.0 devices supported: ■ Four by onboard pin-headers ■ Two by external connectors
SATA	Two 1.5 Gbps SATA drives supported
Keyboard/mouse	One internal pin-header connector
Expansion	One PCIe mini card (PCIe bus)
Digital I/O	One 8-bit digital input/output connector; 4-bit input/4-bit output through the ITE IT8718 super I/O
Watchdog Timer	Software programmable 1-255 sec. through the ITE IT8718 super I/O

Power Supply	5.0 V only 12 V for LCD/System Fan AT and ATX support
Power Consumption	5V @ 2.94 A (1.6 GHz Intel® Atom™ with one 1.0 GB DDR2 SO-DIMM)
Temperature	0ºC – 60ºC (32ºF - 140ºF)
Humidity (operating)	5%~95% non-condensing
Dimensions (LxW)	146 mm x 102 mm
Weight (GW/NW)	700g/230g

Table 1-1: Technical Specifications

Chapter

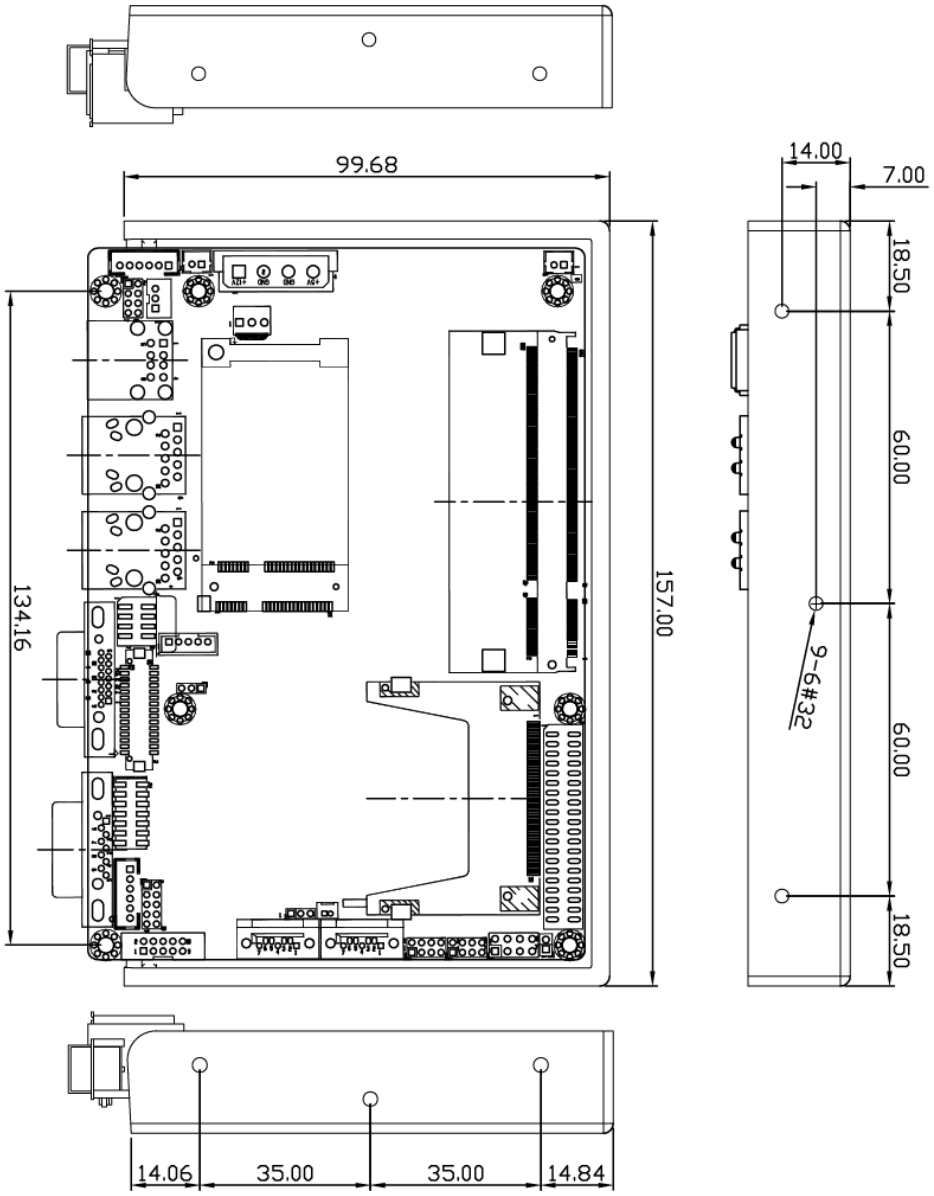
2

Detailed Specifications

2.1 Dimensions

2.1.1 Board Dimensions

The dimensions of the board are shown below:



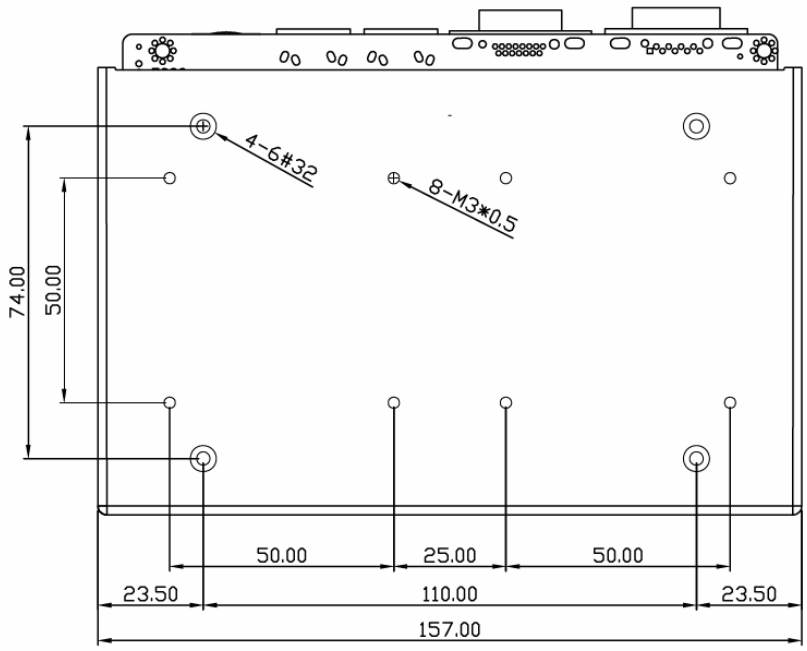


Figure 2-1: WAFER-945GSE Dimensions (mm)

2.1.2 External Interface Panel Dimensions

External peripheral interface connector panel dimensions are shown in **Figure 2-2**.

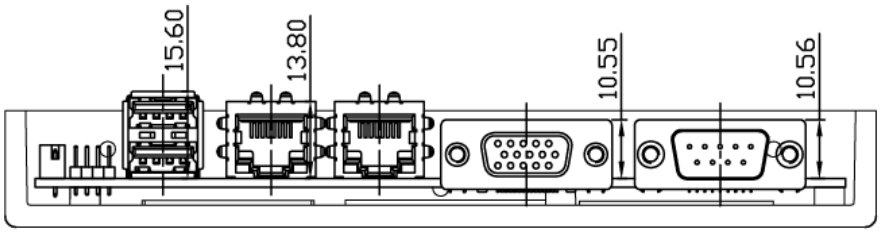


Figure 2-2: External Interface Panel Dimensions (mm)

2.2 Data Flow

Figure 2-3 shows the data flow between the two on-board chipsets and other components installed on the motherboard and described in the following sections of this chapter.

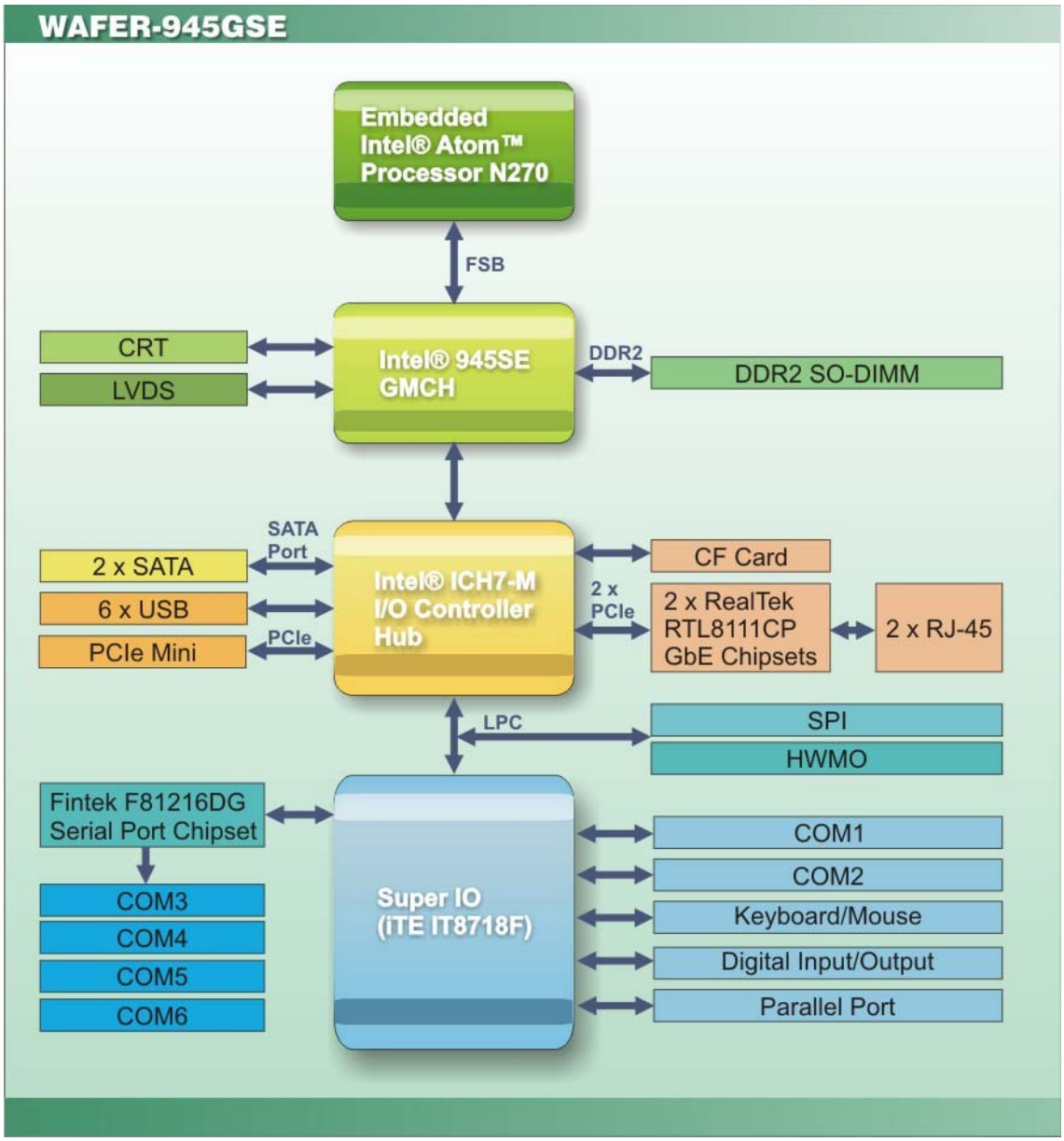


Figure 2-3: Data Flow Block Diagram

2.3 Embedded WAFER-945GSE Processor

2.3.1 Overview

The WAFER-945GSE comes with an embedded 45 nm 1.60 GHz Intel® Atom™ processor N270. The processor supports a 533 MHz FSB and has a 1.6 GHz 512 KB L2

cache. The low power processor has a maximum power of 2.5 W. The processor is covered with a heat sink and is shown in Figure 2-4 below.

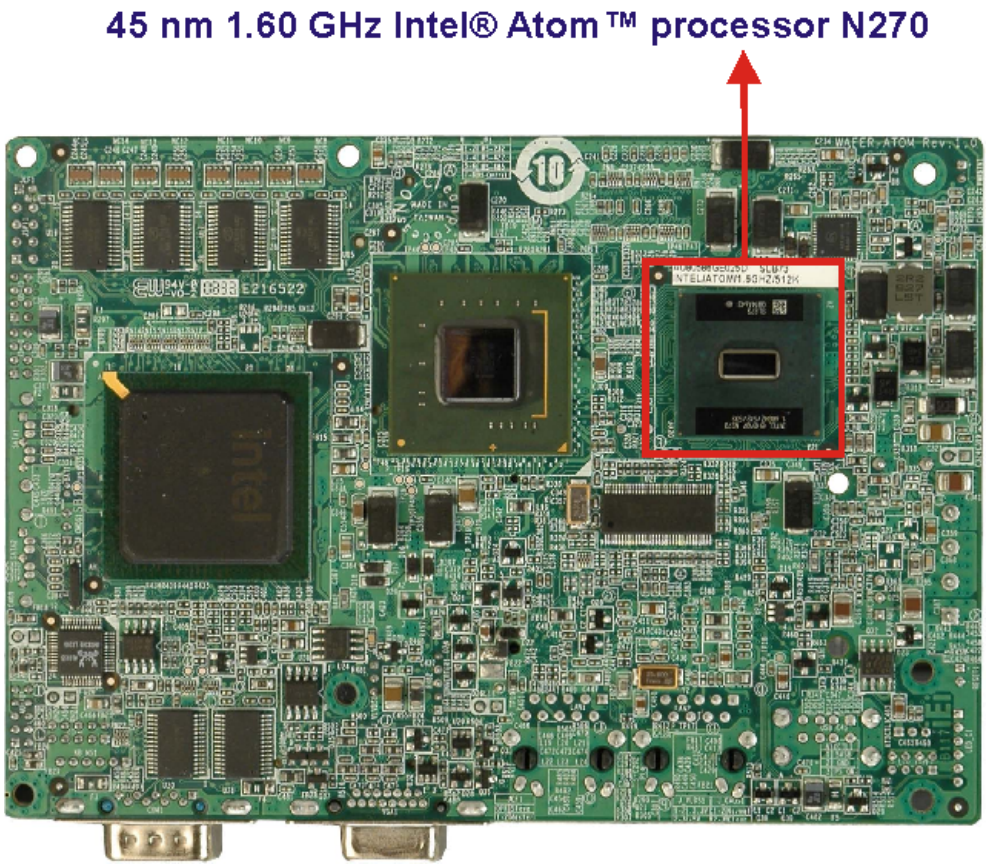


Figure 2-4: Embedded Processor

2.3.2 Features

Some of the features of the Intel® Atom™ processor N270 are listed below

- On-die, primary 32-kB instructions cache and 24-kB write-back data cache
- 533-MHz source-synchronous front side bus (FSB)
- 2-Threads support
- On-die 512-kB, 8-way L2 cache
- Support for IA 32-bit architecture
- Intel® Streaming SIMD Extensions-2 and -3 (Intel® SSE2 and Intel® SSE3) support and Supplemental Streaming SIMD Extension 3 (SSSE3) support
- Micro-FCBGA8 packaging technologies

- Thermal management support via Intel® Thermal Monitor 1 and Intel Thermal Monitor 2
- FSB Lane Reversal for flexible routing
- Supports C0/C1(e)/C2(e)/C4(e)
- L2 Dynamic Cache Sizing
- Advanced power management features including Enhanced Intel SpeedStep® Technology
- Execute Disable Bit support for enhanced security

2.3.3 Front Side Bus (FSB)

The Intel® Atom™ processor on the WAFER-945GSE is interfaced to the Intel 945GSE Northbridge through a 533 MHz front side bus (FSB). The FSB is shown in **Figure 2-5** below.

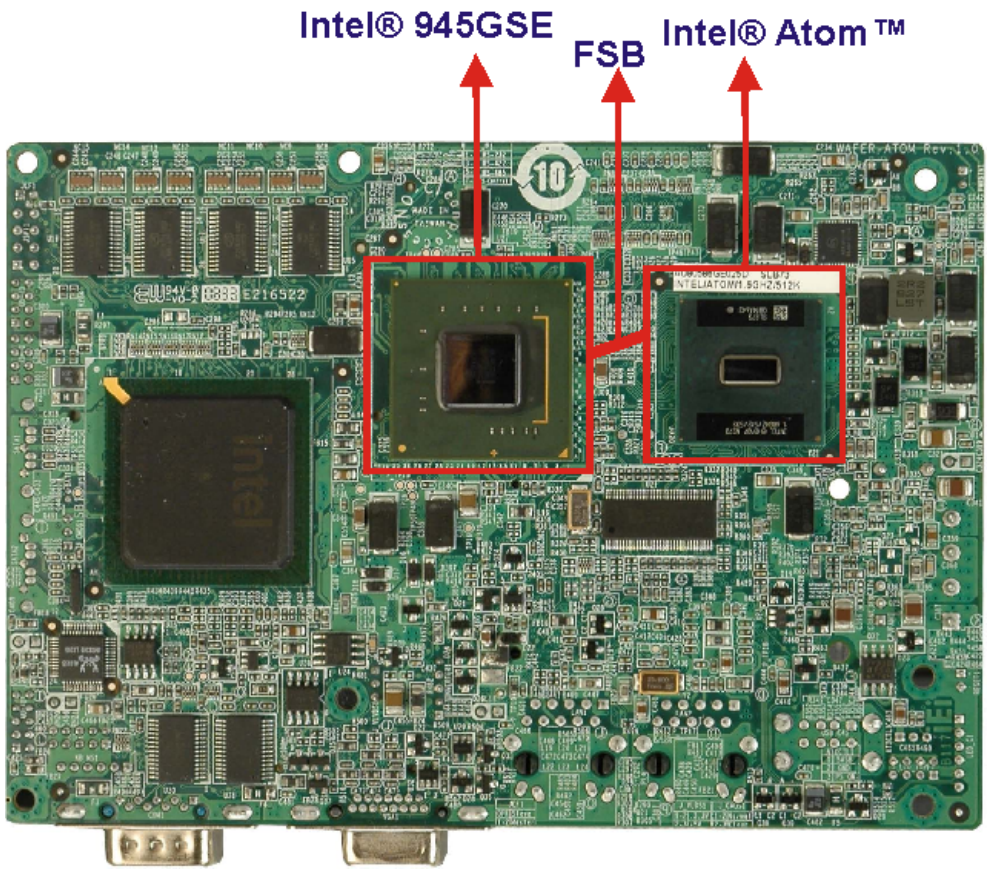


Figure 2-5: Front Side Bus

2.4 Intel 945GSE Northbridge Chipset

2.4.1 Intel® 945GSE Overview

The Intel 945GSE Graphics and Memory Controller Hub (GMCH) supports the embedded Intel® Atom™ N270 processor. The Intel 945GSE is interfaced to the processor through a 533 MHz FSB.

2.4.2 Intel® 945GSE DDR2 Controller

There is one 200-pin DDR2 SO-DIMM socket on the WAFER-945GSE. The socket supports DDR2 SO-DIMM with the following specifications:

- Maximum Memory supported 2 GB (1 GB per rank)
- Support for DDR2 at 400 MHz and 533 MHz
- No support for Dual-Channel Interleaved mode of operation
- Enhanced Addressing support (Swap only)

The SO-DIMM socket is shown in Figure 2-6 below.

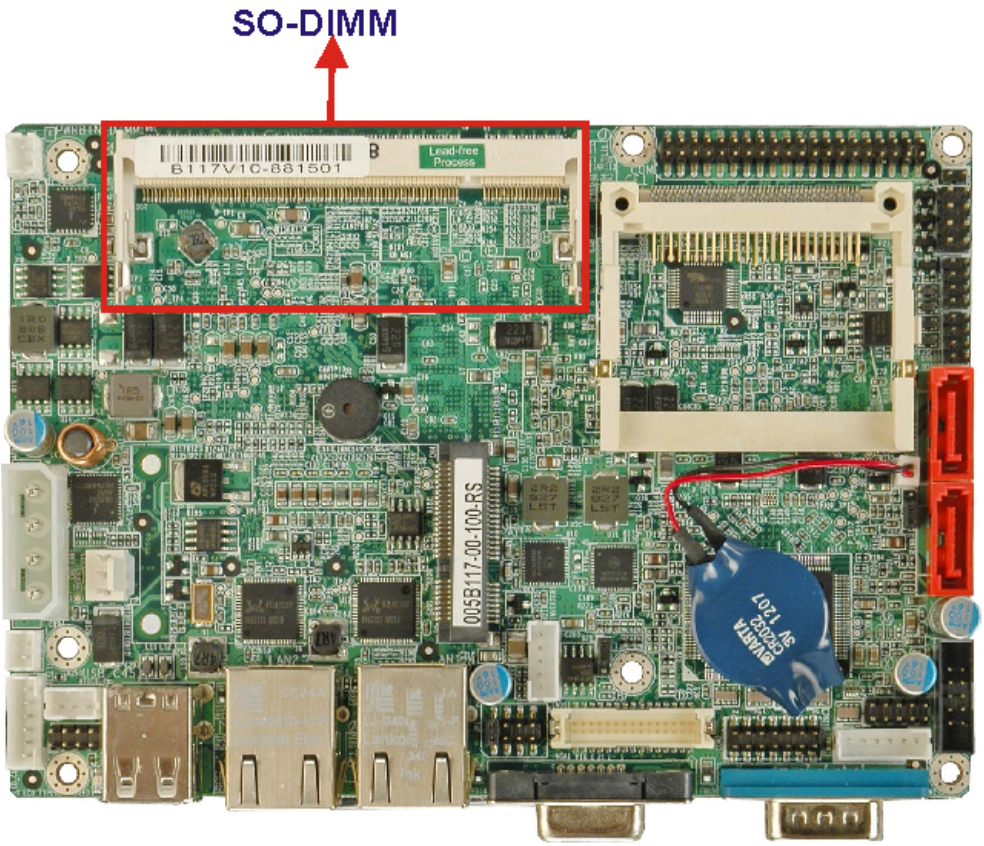


Figure 2-6: DDR2 SO-DIMM Socket

2.4.3 Intel® 945GSE Graphics

The Intel® 945GSE supports CRT and LVDS. The internal graphics engine has the following features:

- Intel® Gen 3.5 Integrated Graphics Engine
- 250-MHz core render clock and 200 MHz core display clock at 1.05-V core voltage
- Supports TV-Out, LVDS, CRT and SDVO
- Dynamic Video Memory Technology (DVMT 3.0)
- Intel® Display Power Saving Technology 2.0 (Intel® DPST 2.0)
- Intel® Smart 2D Display Technology (Intel® S2DDT)
- Intel® Automatic Display Brightness
- Video Capture via x1 concurrent PCIe port
- Concurrent operation of x1 PCIe and SDVO

- 4x pixel rate HWMC
- Microsoft DirectX* 9.1 operating system
- Intermediate Z in Classic Rendering
- Internal Graphics Display Device States: D0, D1, D3
- Graphics Display Adapter States: D0, D3.

2.4.3.1 Analog CRT Graphics Mode

The analog CRT bus is interfaced to an external DB-15 interface connector. The connector is shown below.

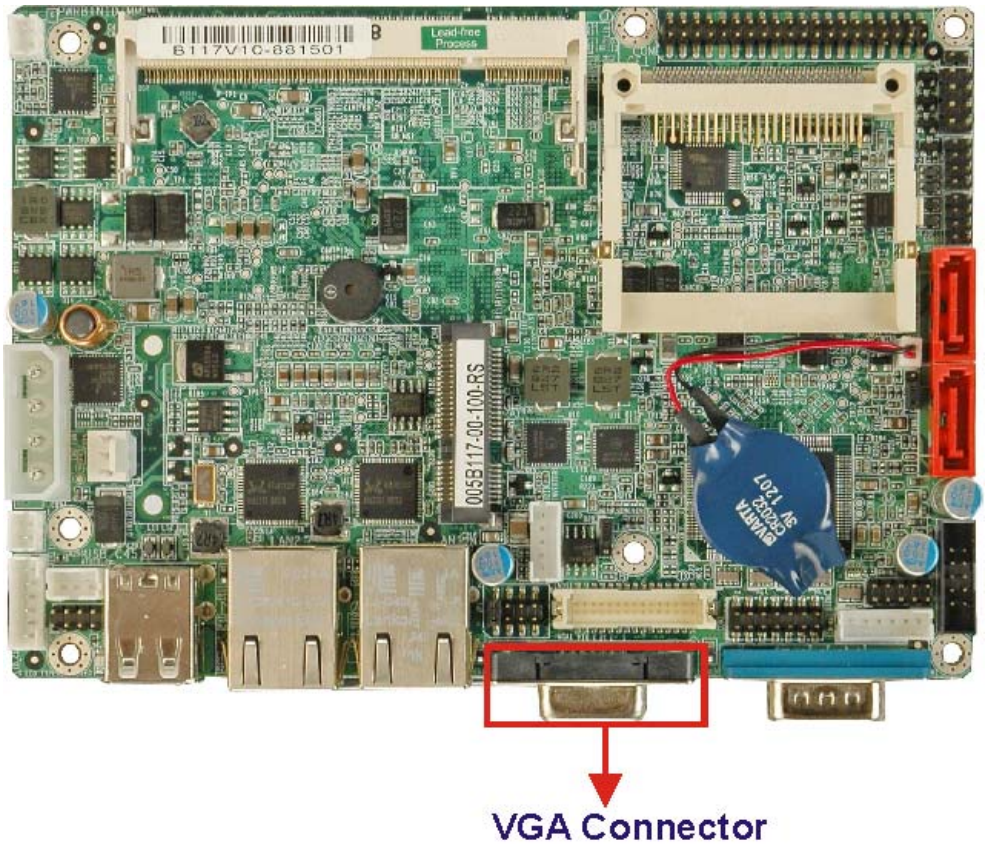


Figure 2-7: VGA Connector

Some of the features of the CRT include:

- Integrated 400-MHz RAMDAC
- Analog Monitor Support up to QXGA

- Support for CRT Hot Plug

2.4.3.2 LVDS Interface

The LVDS interface is connected directly to one of the LVDS connectors on the board.

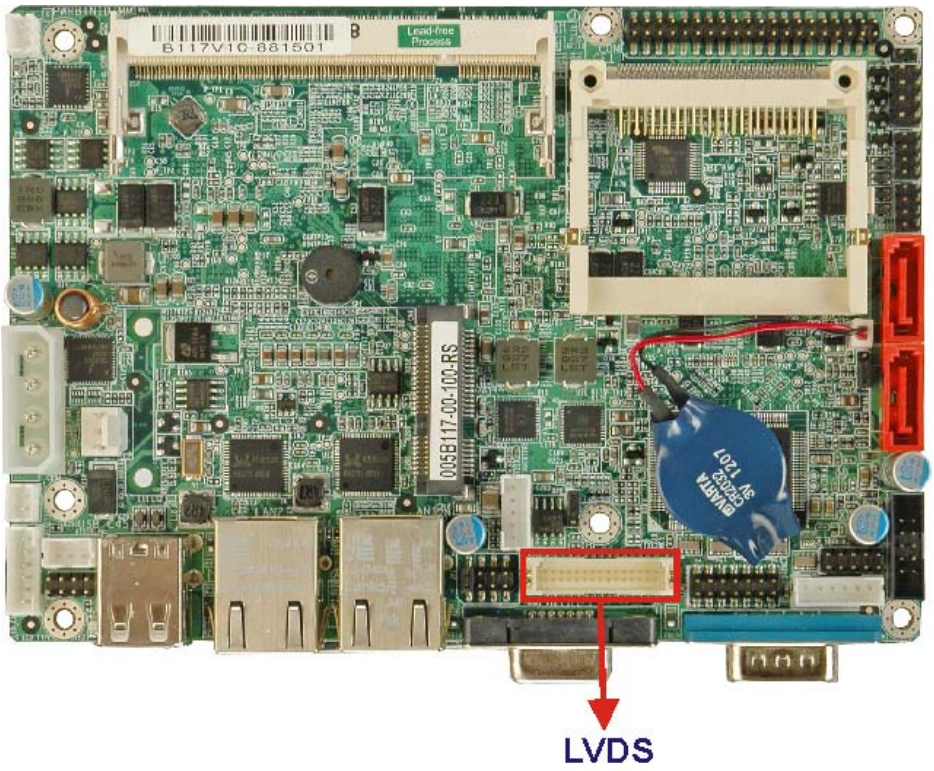


Figure 2-8: LVDS Connector

Some of the features of the LVDS interface include:

- Panel support up to UXGA (1600 x 1200)
- 25-MHz to 112-MHz single-/dual-channel; @18 bpp
  - TFT panel type supported
- Pixel Dithering for 18-bit TFT panel to emulate 24-bpp true color displays
- Panel Fitting. Panning, and Center Mode Supported
- CPIS 1.5 compliant
- Spread spectrum clocking supported
- Panel Power Sequencing support
- Integrated PWM interface for LCD backlight inverter control

2.5 Intel® ICH7-M Southbridge Chipset

2.5.1 Intel® ICH7-M Overview

The Intel® ICH7-M southbridge chipset is connected to the Intel® 945GSE northbridge GMCH through the chip-to-chip Direct Media Interface (DMI).

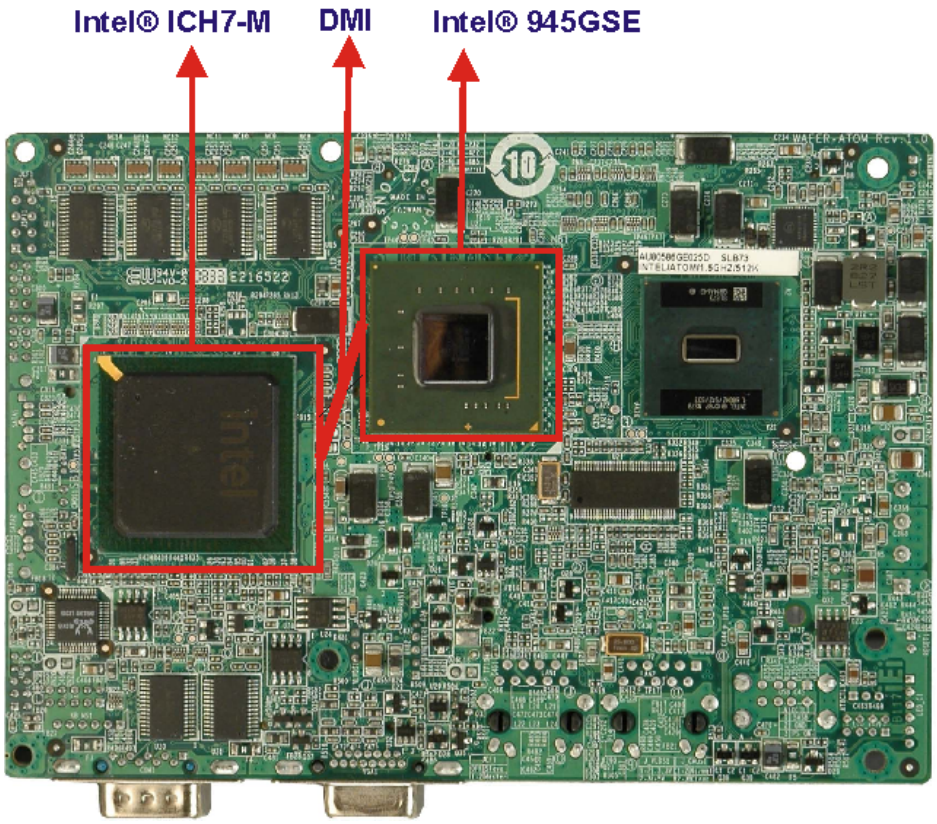


Figure 2-9: Direct Media Interface

Some of the features of the Intel® ICH7-M are listed below.

- Complies with PCI Express Base Specification, Revision 1.0a
- Complies with PCI Local Bus Specification, Revision 2.3 and supports 33MHz PCI operations
- Supports ACPI Power Management Logic
- Contains:
  - Enhanced DMA controller

- Interrupt controller
- Timer functions

- Integrated SATA host controller with DMA operations interfaced to four SATA connectors on the WAFER-945GSE
- Integrated IDE controller supports Ultra ATA 100/66/33
- Supports the four USB 2.0 devices on the WAFER-945GSE with four UHCI controllers and one EHCI controller
- Complies with System Management Bus (SMBus) Specification, Version 2.0
- Supports Audio Codec ’97 (AC’97) Revision 2.3
- Supports Intel® High Definition Audio
- Contains Low Pin Count (LPC) interface
- Supports Firmware Hub (FWH) interface
- Serial peripheral interface support

2.5.2 Intel® ICH7-M Audio Codec ’97 Controller

The Integrated AC'97 v2.3 compliant audio controller is integrated to a RealTek ALC655 audio codec. The RealTek ALC655 is in turn connected to onboard audio connectors, which are then connected to compliant audio devices. The RealTek ALC655 is a 16-bit, full-duplex AC'97 Rev. 2.3 compatible six-channel audio codec. The codec and the audio connectors are shown in **Figure 2-10**.

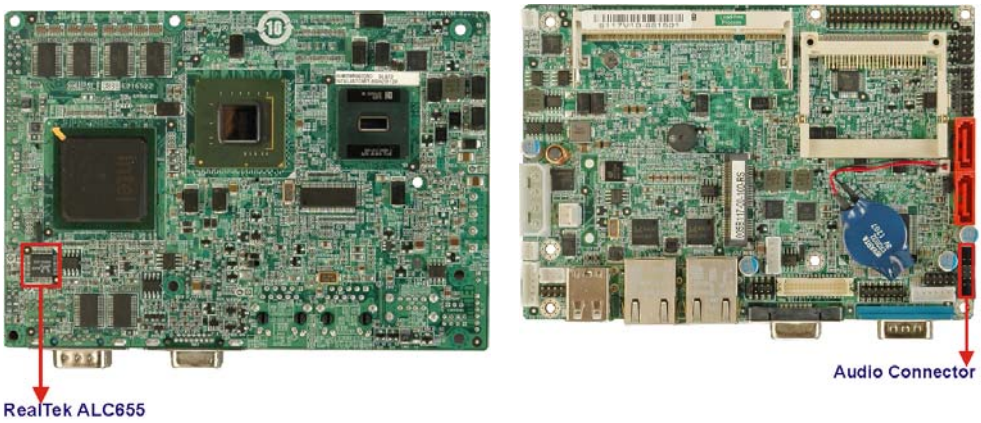


Figure 2-10: Audio Codec and Connectors

Some of the features of the RealTek ALC655 are listed below:

- Meets performance requirements for audio on PC99/2001 systems
- Meets Microsoft WHQL/WLP 2.0 audio requirements
- 16-bit Stereo full-duplex CODEC with 48KHz sampling rate
- Compliant with AC'97 Rev 2.3 specifications
  - Front-Out, Surround-Out, MIC-In and LINE-In Jack Sensing
  - 14.318MHz -> 24.576MHz PLL to eliminate crystal
  - 12.288MHz BITCLK input
  - Integrated PCBEEP generator to save buzzer
  - Interrupt capability
- Three analog line-level stereo inputs with 5-bit volume control, LINE_IN, CD, AUX
- High-quality differential CD input
- Two analog line-level mono inputs: PCBEEP, PHONE-IN
- Two software selectable MIC inputs
- Dedicated Front-MIC input for front panel applications (software selectable)
- Boost preamplifier for MIC input
- LINE input shared with surround output; MIC input shared with Center and LFE output
- Built-in 50mW/20ohm amplifier for both Front-out and Surround-Out
- External Amplifier Power Down (EAPD) capability
- Power management and enhanced power saving features
- Supports Power-Off CD function
- Adjustable VREFOUT control
- Supports 48KHz S/PDIF output, complying with AC'97 Rev 2.3 specifications
- Supports 32K/44.1K/48KHz S/PDIF input
- Power support: Digital: 3.3V; Analog: 3.3V/5V
- Standard 48-pin LQFP package
- EAX™ 1.0 & 2.0 compatible
- Direct Sound 3D™ compatible
- A3D™ compatible
- I3DL2 compatible
- HRTF 3D positional audio
- 10-band software equalizer

2.5.3 Intel® ICH7-M Low Pin Count (LPC) Interface

The ICH7-M LPC interface complies with the LPC 1.1 specifications. The LPC bus from the ICH6 is connected to the following components:

- BIOS chipset
- Super I/O chipset

2.5.4 Intel® ICH7-M PCIe Bus

The Intel® ICH7-M southbridge chipset has four PCIe lanes. Two of the four PCIe lanes are interfaced to PCIe GbE controller. A third PCIe lane is interfaced to a PCIe mini socket.

2.5.4.1 PCIe GbE Ethernet

Two PCIe lanes are connected to two Realtek RTL8111C PCIe GbE controllers shown in Figure 2-11 below.

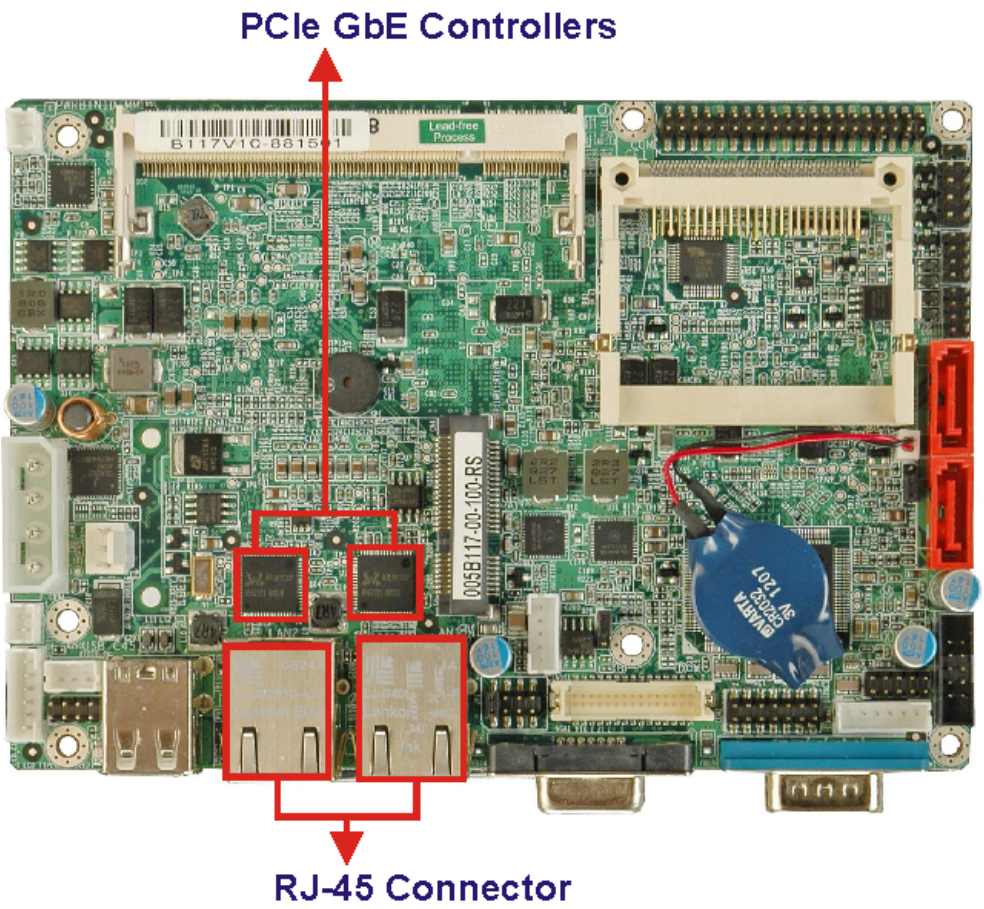


Figure 2-11: Realtek RTL8111C PCIe GbE Controllers

The Realtek RTL8111C PCIe GbE controllers combine a triple-speed IEEE 802.3 compliant Media Access Controller (MAC) with a triple-speed Ethernet transceiver, 32-bit PCIe bus controller, and embedded memory. With state-of-the-art DSP technology and mixed-mode signal technology, they offer high-speed transmission over CAT 5 UTP cable or CAT 3 UTP (10Mbps only) cable. Functions such as Crossover Detection & Auto-Correction, polarity correction, adaptive equalization, cross-talk cancellation, echo cancellation, timing recovery, and error correction are implemented to provide robust transmission and reception capability at high speeds.

Some of the features of the Realtek RTL8111C PCIe GbE controllers are listed below.

- Integrated 10/100/1000 transceiver

- Auto-Negotiation with Next Page capability
- Supports PCI Express™ 1.1
- Supports pair swap/polarity/skew correction
- Crossover Detection & & Auto-Correction
- Wake-on-LAN and remote wake-up support
- Microsoft® NDIS5, NDIS6 Checksum Offload (IPv4, IPv6, TCP, UDP) and Segmentation Task-offload (Large send and Giant send) support
- Supports Full Duplex flow control (IEEE 802.3x)
- Fully compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3ab
- Supports IEEE 802.1P Layer 2 Priority Encoding
- Supports IEEE 802.1Q VLAN tagging
- Serial EEPROM
- Transmit/Receive on-chip buffer support
- Supports power down/link down power saving
- Supports PCI MSI (Message Signaled Interrupt) and MSI-X
- Supports Receive-Side Scaling (RSS)

2.5.4.2 PCIe Mini Expansion Slot

One PCIe x1 port and one USB 2.0 port on the ICH7M is interfaced directly to a PCIe mini expansion slot. This enables the addition of PICe mini expansion devices. The PCIe mini slot is shown in Figure 2-12.

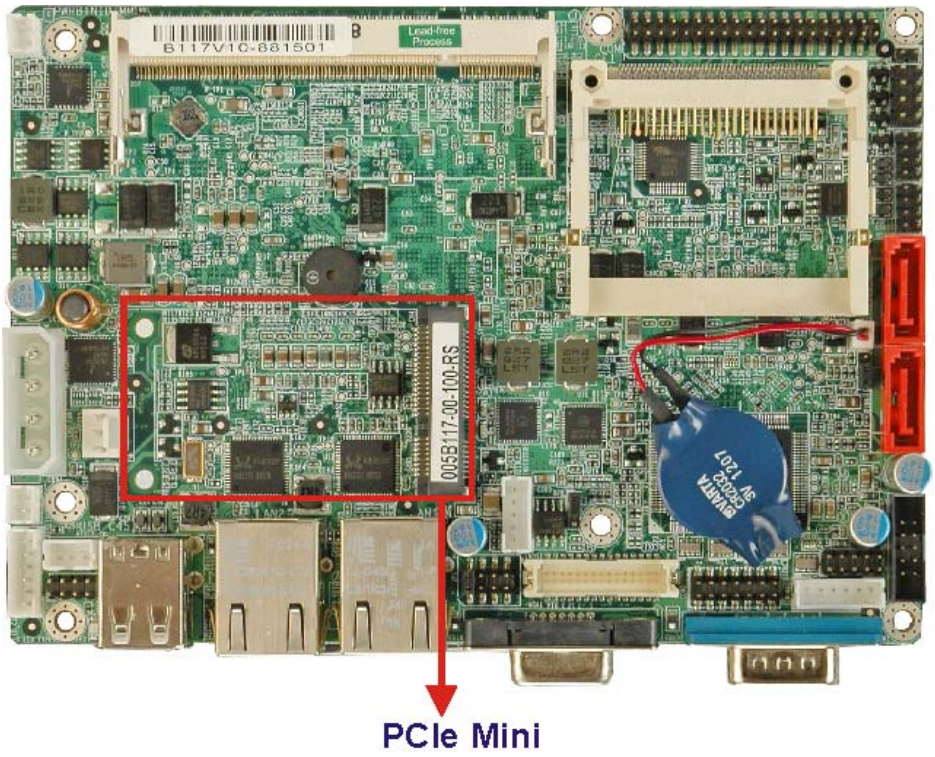


Figure 2-12: PCIe Mini Slot

2.5.5 Intel® ICH7-M Real Time Clock

256 bytes of battery backed RAM is provided by the Motorola MC146818A real time clock (RTC) integrated into the ICH6. The RTC operates on a 3V battery and 32.768KHz crystal. The RTC keeps track of the time and stores system data even when the system is turned off.

2.5.6 Intel® ICH7-M SATA Controller

The integrated SATA controller on the ICH7-M southbridge supports up to four SATA drives with independent DMA operations. Two SATA controllers are connected to two SATA connectors on the WAFER-945GSE. The SATA connectors are shown in Figure 2-13.

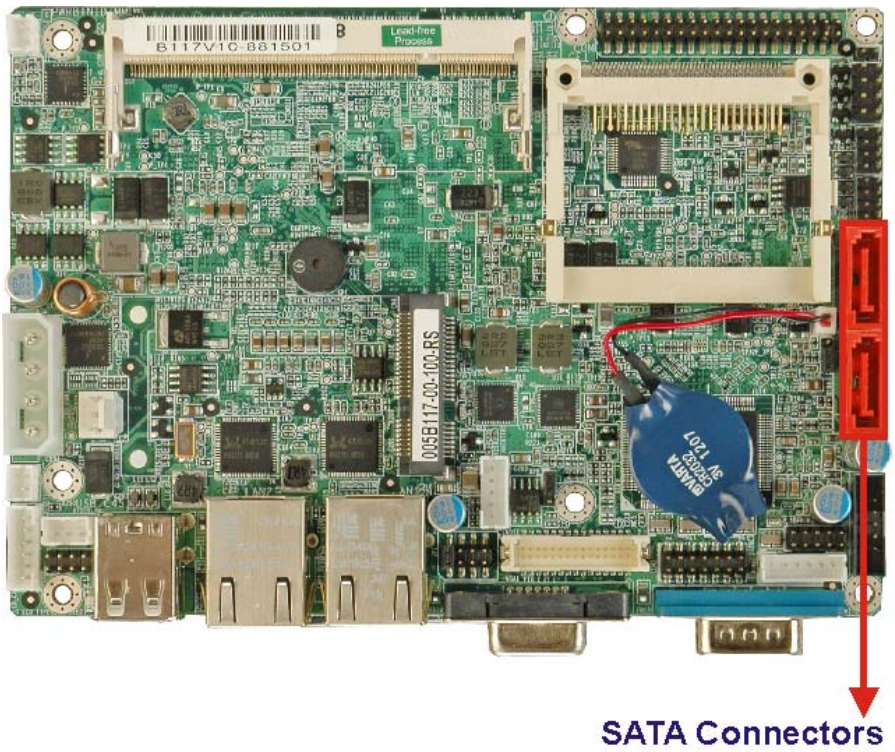


Figure 2-13: SATA Connectors

SATA controller specifications are listed below.

- Supports four SATA drives
- Supports 1.5 Gb/s data transfer speeds
- Supports Serial ATA Specification, Revision 1.0a

2.5.7 Intel® ICH7-M USB Controller

Up to six high-speed, full-speed or low-speed USB devices are supported by the ICH7-M on the WAFER-945GSE. High-speed USB 2.0, with data transfers of up to 480MB/s, is enabled with the ICH7-M integrated Enhanced Host Controller Interface (EHCI) compliant host controller. USB full-speed and low-speed signaling is supported by the ICH7-M integrated Universal Host Controller Interface (UHCI) controllers.

The six USB ports implemented on the WAFER-945GSE are connected to two internal connectors and one external connector. See **Figure 2-14**.

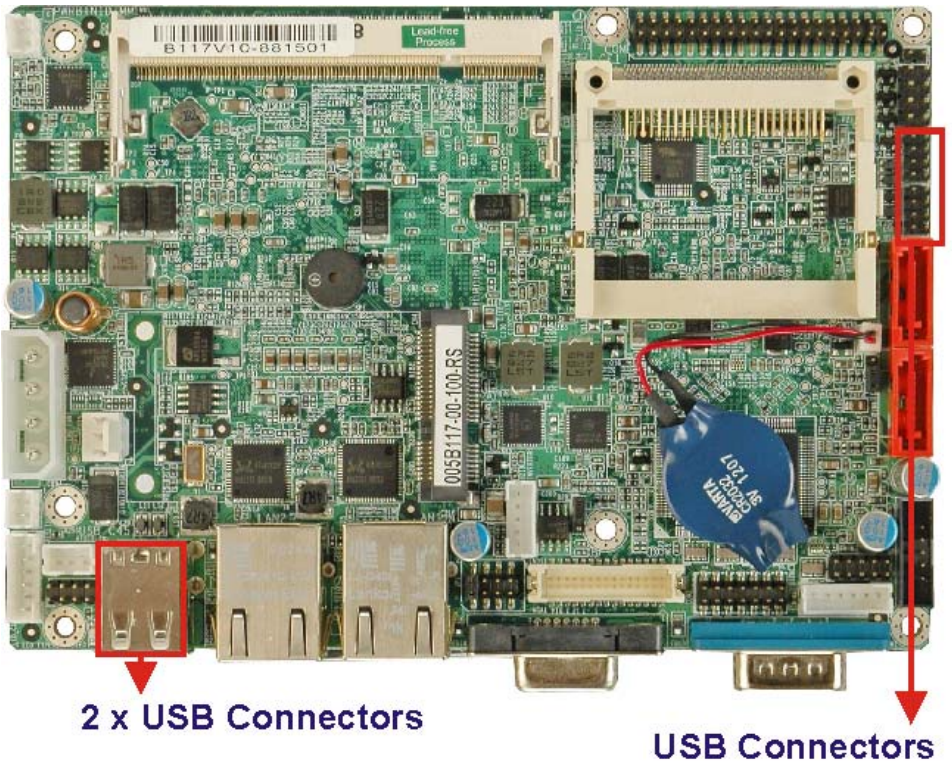


Figure 2-14: Onboard USB Implementation

2.6 LPC Bus Components

2.6.1 LPC Bus Overview

The SIS964 LPC bus is connected to components listed below:

- BIOS chipset
- Super I/O chipset
- LPC Serial Port Chipset

2.6.2 BIOS Chipset

The BIOS chipset has a licensed copy of AMI BIOS installed on the chipset. Some of the BIOS features are listed below:

- AMI Flash BIOS
- SMIBIOS (DMI) compliant

- Console redirection function support
- PXE (Pre-boot Execution Environment) support
- USB booting support

2.6.3 iTE IT8718F Super I/O chipset

The iTE IT8718F Super I/O chipset is connected to the ICH7-M southbridge through the LPC bus.

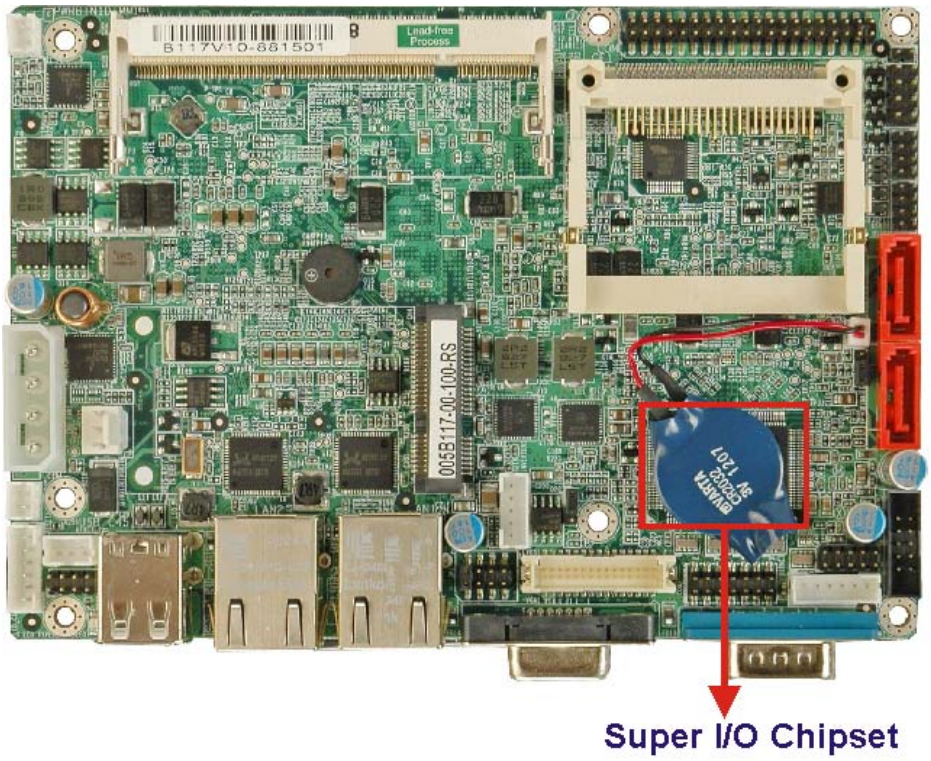


Figure 2-15: Super I/O

The iTE IT8718F is an LPC interface-based Super I/O device that comes with Environment Controller integration. Some of the features of the iTE IT8718F chipset are listed below:

- ACPI and LANDesk Compliant
- Enhanced Hardware Monitor
- Fan Speed Controller

- Two 16C550 UARTs for serial port control
- One IEEE 1284 Parallel Port
- Keyboard Controller
- Watchdog Timer

Some of the Super I/O features are described in more detail below:

2.6.3.1 Super I/O LPC Interface

The LPC interface on the Super I/O complies with the Intel® Low Pin Count Specification Rev. 1.0. The LPC interface supports both LDRQ# and SERIRQ protocols as well as PCI PME# interfaces.

2.6.3.2 Super I/O 16C550 UARTs

The onboard Super I/O has two integrated 16C550 UARTs that can support the following:

- Two standard serial ports (COM1 and COM2)
- IrDa 1.0 and ASKIR protocols

Another chipset connected to the LPC bus provided connectivity to another two serial port connectors (COM3 and COM4).

2.6.3.3 Super I/O Digital Input/Output

The input mode supports switch debouncing or programmable external IRQ routing. The output mode supports two sets of programmable LED blinking periods.

2.6.3.4 Super I/O Enhanced Hardware Monitor

The Super I/O Enhanced Hardware Monitor monitors three thermal inputs, VBAT internally, and eight voltage monitor inputs. These hardware parameters are reported in the BIOS and can be read from the BIOS Hardware Health Configuration menu.

2.6.3.5 Super I/O Fan Speed Controller

The Super I/O fan speed controller enables the system to monitor the speed of the fan. One of the pins on the fan connector is reserved for fan speed detection and interfaced to the fan speed controller on the Super I/O. The fan speed is then reported in the BIOS.

2.6.3.6 Super I/O Keyboard/Mouse Controller

The Super I/O keyboard/mouse controller can execute the 8042 instruction set. Some of the keyboard controller features are listed below:

- The 8042 instruction is compatible with a PS/2 keyboard and PS/2 mouse
- Gate A20 and Keyboard reset output
- Supports multiple keyboard power on events
- Supports mouse double-click and/or mouse move power on events

2.6.4 Fintek F81216DG LPC Serial Port Chipset

The Fintek F81216DG chipset enables the addition of four additional UART serial ports (COM3, COM4, COM5 and COM6). UART includes 16-byte send/receive FIFO. The Fintek serial port chipset is interfaced to the Southbridge chipset through the LPC bus. Some of the features of the Fintek chipset are listed below:

- Supports LPC interface
- Totally provides 4 UART (16550 asynchronous) ports
  - 3 x Pure UART
  - 1 x UART+IR
- One Watch dog timer with WDTOUT# signal
- One Frequency input 24/48MHz
- Powered by 3Vcc

2.7 Environmental and Power Specifications

2.7.1 System Monitoring

Two thermal inputs on the WAFER-945GSE Super I/O Enhanced Hardware Monitor monitor the following temperatures:

- System temperature
- CPU temperature

Eight voltage inputs on the WAFER-945GSE Super I/O Enhanced Hardware Monitor monitor the following voltages:

- CPU Core
- +1.05V
- +3.3V
- +12V
- +1.5V
- +1.8V
- +5VSB
- VBAT

The WAFER-945GSE Super I/O Enhanced Hardware Monitor also monitors the following fan speeds:

- CPU Fan speed

The values for the above environmental parameters are all recorded in the BIOS Hardware Health Configuration menu.

2.7.2 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the WAFER-945GSE are listed below.

- Minimum Operating Temperature: 0ºC (32°F)
- Maximum Operating Temperature: 60°C (140°F)

A cooling fan and heat sink must be installed on the CPU. Thermal paste must be smeared on the lower side of the heat sink before it is mounted on the CPU. Heat sinks are also mounted on the northbridge and southbridge chipsets to ensure the operating temperature of these chips remain low.

2.7.3 Power Consumption

Table 2-1 shows the power consumption parameters for the WAFER-945GSE running with a 1.6 GHz Intel® Atom™ with 1.0 GB DDR2 memory.

Voltage	Current
+5V	2.94A

Table 2-1: Power Consumption

Chapter

3

Unpacking

3.1 Anti-static Precautions

WARNING!

Failure to take ESD precautions during the installation of the WAFER-945GSE may result in permanent damage to the WAFER-945GSE and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-945GSE. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-945GSE, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***:- Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: When configuring the WAFER-945GSE, place it on an antic-static pad. This reduces the possibility of ESD damaging the WAFER-945GSE.
- ***Only handle the edges of the PCB***:- When handling the PCB, hold the PCB by the edges.

3.2 Unpacking

3.2.1 Unpacking Precautions

When the WAFER-945GSE is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 3.1**.
- Make sure the packing box is facing upwards so the WAFER-945GSE does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.

3.3 Unpacking Checklist

NOTE:

If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the WAFER-945GSE was purchased from or contact an IEI sales representative directly by sending an email to sales@iei.com.tw.

3.3.1 Package Contents

The WAFER-945GSEWAFER-945GSE is shipped with the following components:

Quantity	Item and Part Number	Image
1	WAFER-945GSE	
2	SATA cable (**P/N**: 32000-062800-RS)	
1	KB/MS Cable (**P/N**: 32000-023800-RS)	
1	Audio cable (**P/N:** 32000-072100-RS)	
1	Enclosure heat sink	

1	4 COM (wo bracket) (**P/N**: 32200-025401-RS)	
1	Mini jumper pack (2.0mm) (**P/N**:33100-000033-RS)	
1	Utility CD	
1	Quick Installation Guide	

3.3.2 Optional Items

The WAFER-945GSE is shipped with the following components:

Item and Part Number	Image
Dual USB cable (wo bracket) (**P/N**: 32000-070301-RS)	
RS-232/422/485 cable (**P/N**:32200-026500-RS)	
ATX cable (**P/N**: 32100-052100)	
SATA power cable (**P/N**: 32100-088600-RS)	
4 COM (w bracket) (**P/N**: IO-KIT-4COM-R10)	

Chapter

4

Connectors

4.1 Peripheral Interface Connectors

Section 4.2 shows peripheral interface connector locations. Section 4.2 lists all the peripheral interface connectors seen in Section 4.2.

4.1.1 WAFER-945GSEWAFER-945GSE Layout

Figure 4-1 shows the on-board peripheral connectors, rear panel peripheral connectors and on-board jumpers.

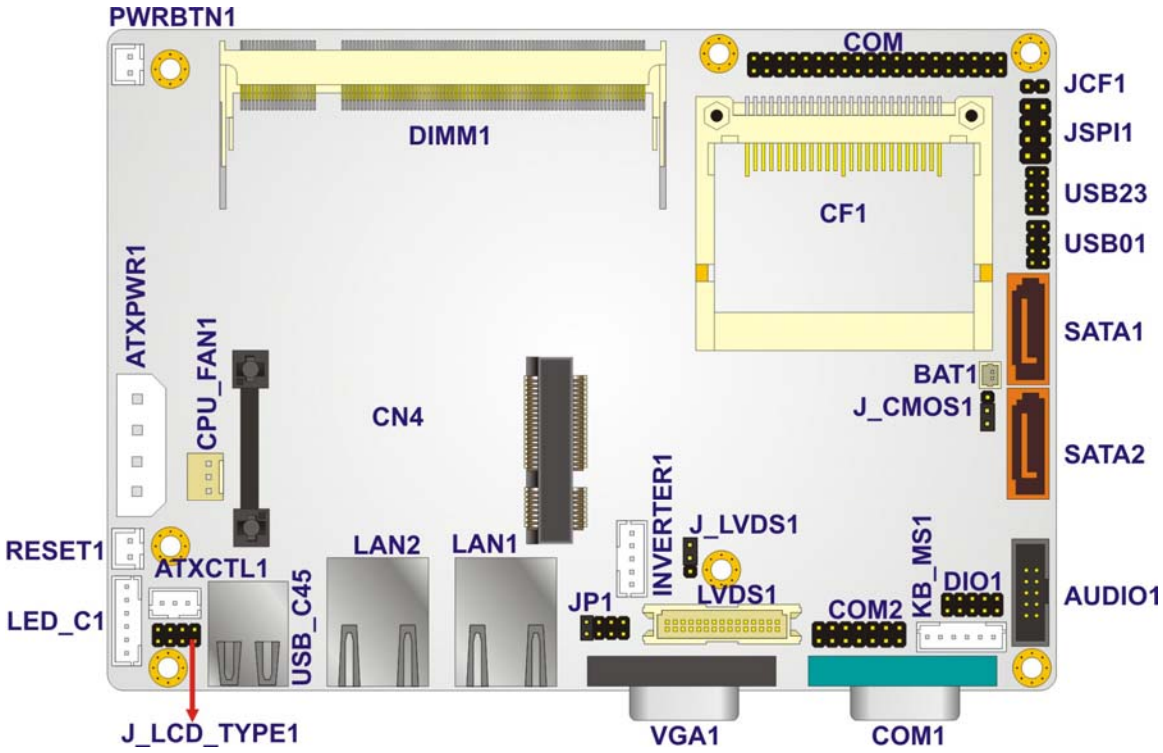


Figure 4-1: Connector and Jumper Locations [Front Side]

4.2 Peripheral Interface Connectors

Table 4-1 shows a list of the peripheral interface connectors on the WAFER-945GSE. Detailed descriptions of these connectors can be found below.

Connector	Type	Label
Audio connector	10-pin header	AUDIO1
ATX enable connector	3-pin wafer	ATXCTL1
ATX power connector	4-pin ATX	ATXPWR1
Backlight inverter connectors	5-pin wafer	INVERTER1
CompactFlash® socket	50-pin CF socket	CF1
Digital input/output (DIO) connector	10-pin header	DIO1
Fan connector	3-pin wafer	CPU_FAN1
Keyboard and mouse connector	6-pin wafer	KB_MS1
LED connector	6-pin header	LED_C1
LVDS connector	30-pin crimp	LVDS1
PCIe Mini Card slot	PCIe Mini Slot	CN4
Power Button	2-pin wafer	PWRBTN1
Reset button connector	2-pin header	RESET1
Serial ATA (SATA) drive connectors	7-pin SATA	SATA1
Serial ATA (SATA) drive connectors	7-pin SATA	SATA2
RS-232 serial port connector (COM3 – COM6)	40-pin header	COM
RS-232/422/485 serial port connector	14-pin header	COM2
USB 2.0 connector	8-pin header	USB01
USB 2.0 connector	8-pin header	USB23

Table 4-1: Peripheral Interface Connectors

4.2.1 External Interface Panel Connectors

Table 4-2 lists the rear panel connectors on the WAFER-945GSE. Detailed descriptions of these connectors can be found in **Section 4.4** on **page 57**.

Connector	Type	Label
Ethernet connector	RJ-45	LAN1
Ethernet connector	RJ-45	LAN2
RS-232 serial port connector	Male DB-9	COM1
Dual USB port	USB port	USB_C45
VGA port connector	15-pin female	VGA1

Table 4-2: Rear Panel Connectors

4.3 Internal Peripheral Connectors

Internal peripheral connectors are found on the motherboard and are only accessible when the motherboard is outside of the chassis. This section has complete descriptions of all the internal, peripheral connectors on the WAFER-945GSE.

4.3.1 ATX Power Connector

CN Label: **ATXPWR1**

CN Type: 4-pin AT power connector (1x4)

CN Location: See **Figure 4-2**

CN Pinouts: See **Table 4-3**

The 4-pin ATX power connector is connected to an ATX power supply.

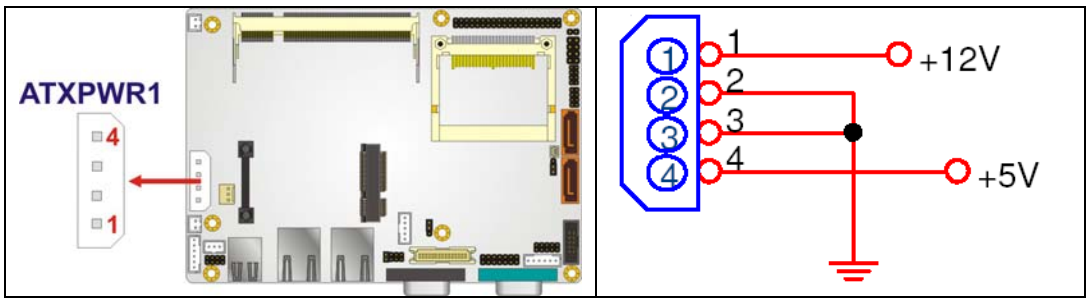


Figure 4-2: ATX Power Connector Location

PIN NO.	DESCRIPTION
1	+12V
2	GND
3	GND
4	+5V

Table 4-3: ATX Power Connector Pinouts

4.3.2 ATX Power Supply Enable Connector

CN Label: **ATXCTL1**

CN Type: 3-pin wafer (1x3)

CN Location: See **Figure 4-3**

CN Pinouts: See **Table 4-4**

The ATX power supply enable connector enables the WAFER-945GSE to be connected to an ATX power supply. In default mode, the WAFER-945GSE can only us an AT power supply. To enable an ATX power supply the AT Power Select jumper must also be configured. Please refer to Chapter 3 for more details.

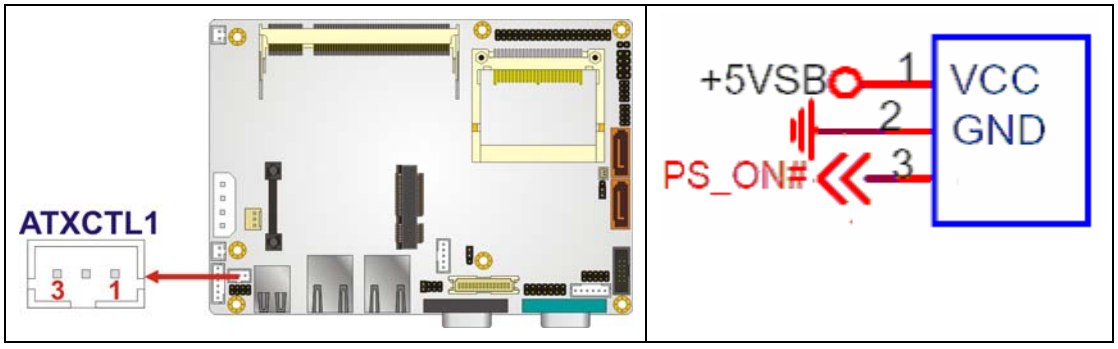


Figure 4-3: ATX Power Supply Enable Connector Location

PIN NO.	DESCRIPTION
1	+5V Standby
2	GND

3	PS-ON

Table 4-4: ATX Power Supply Enable Connector Pinouts

4.3.3 Audio Connector (10-pin)

CN Label: **AUDIO1**

CN Type: 10-pin header

CN Location: See **Figure 4-4**

CN Pinouts: See **Table 4-5**

The 10-pin audio connector is connected to external audio devices including speakers and microphones for the input and output of audio signals to and from the system.

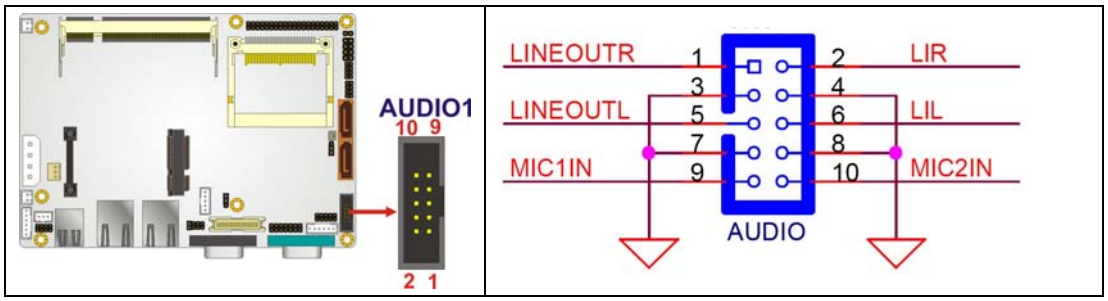


Figure 4-4: Audio Connector Pinouts (10-pin)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Line out R	2	Line in R
3	GND	4	GND
5	Line out L	6	Line in L
7	GND	8	GND
9	MIC in	10	Mic in

Table 4-5: Audio Connector Pinouts (10-pin)

4.3.4 Backlight Inverter Connector

CN Label: **INVERTER1**

CN Type: 5-pin wafer (1x5)

CN Location: See **Figure 4-5**

CN Pinouts: See **Table 4-6**

The backlight inverter connectors provide the backlights on the LCD display connected to the WAFER-945GSE with +12V of power.

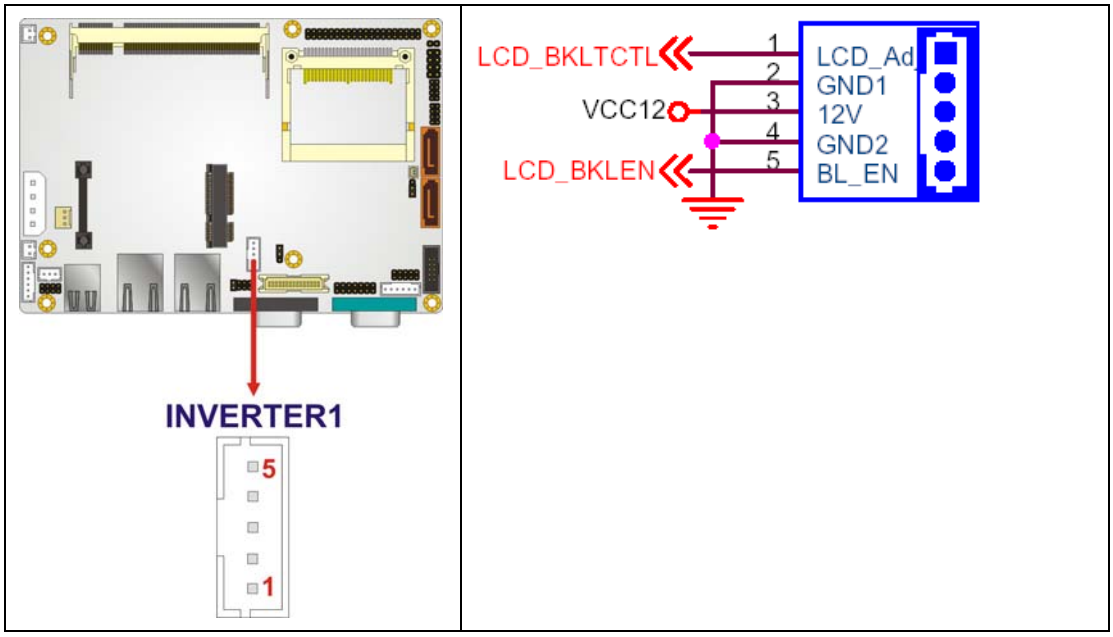


Figure 4-5: Panel Backlight Connector Pinout Locations

PIN NO.	DESCRIPTION
1	LCD Backlight Control
2	GROUND
3	+12V
4	GROUND
5	BACKLIGHT Enable

Table 4-6: Panel Backlight Connector Pinouts

4.3.5 CompactFlash® Socket

CN Label: **CF1**

CN Type: 50-pin header (2x25)

CN Location: See **Figure 4-6**

CN Pinouts: See **Table 4-7**

A CF Type I or Type II memory card is inserted to the CF socket on the solder side of the WAFER-945GSE.

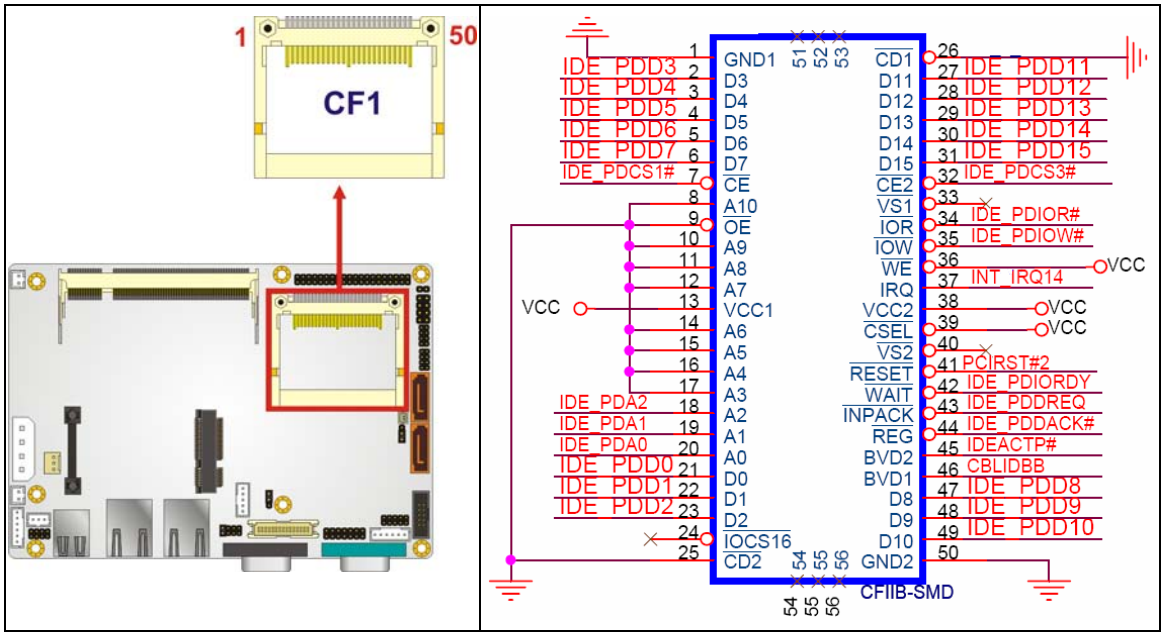


Figure 4-6: CF Card Socket Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	26	VCC-IN CHECK1
2	DATA 3	27	DATA 11
3	DATA 4	28	DATA 12
4	DATA 5	29	DATA 13
5	DATA 6	30	DATA 14
6	DATA 7	31	DATA 15

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
7	HDC_CS0#	32	HDC_CS1
8	GROUND	33	N/C
9	GROUND	34	IOR#
10	GROUND	35	IOW#
11	GROUND	36	VCC_COM
12	GROUND	37	IRQ14
13	VCC_COM	38	VCC_COM
14	GROUND	39	CSEL
15	GROUND	40	N/C
16	GROUND	41	HDD_RESET
17	GROUND	42	IORDY
18	SA2	43	SDREQ
19	SA1	44	SDACK#
20	SA0	45	HDD_ACTIVE#
21	DATA 0	46	66DET
22	DATA 1	47	DATA 8
23	DATA 2	48	DATA 9
24	N/C	49	DATA 10
25	VCC-IN CHECK2	50	GROUND

Table 4-7: CF Card Socket Pinouts

4.3.6 Digital Input/Output (DIO) Connector

CN Label: **DIO1**

CN Type: 10-pin header (2x5)

CN Location: See **Figure 4-7**

CN Pinouts: See **Table 4-8**

The digital input/output connector is managed through a Super I/O chip. The DIO connector pins are user programmable.

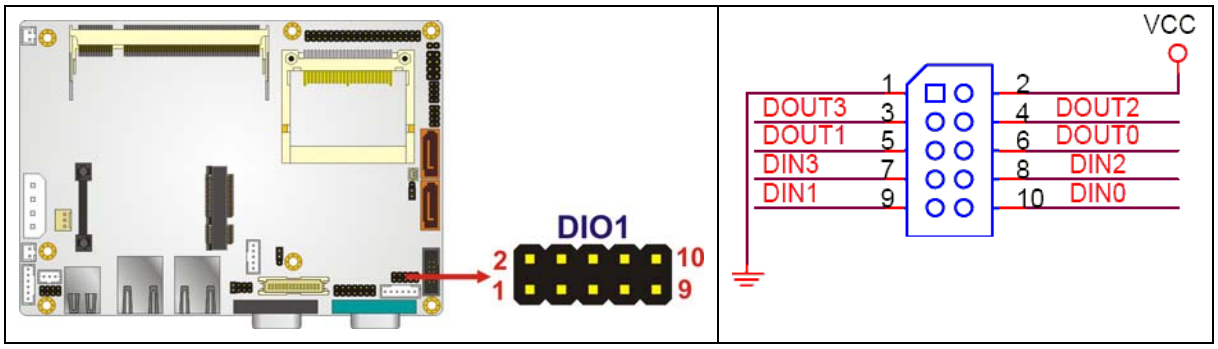


Figure 4-7: DIO Connector Connector Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	VCC
3	Output 3	4	Output 2
5	Output 1	6	Output 0
7	Input 3	8	Input 2
9	Input 1	10	Input 0

Table 4-8: DIO Connector Connector Pinouts

4.3.7 Fan Connector (+12V, 3-pin)

CN Label: CPU_FAN1

CN Type: 3-pin header

CN Location: See Figure 4-8

CN Pinouts: See Table 4-9

The cooling fan connector provides a 12V, 500mA current to the cooling fan. The connector has a "rotation" pin to get rotation signals from fans and notify the system so the system BIOS can recognize the fan speed. Please note that only specified fans can issue the rotation signals.

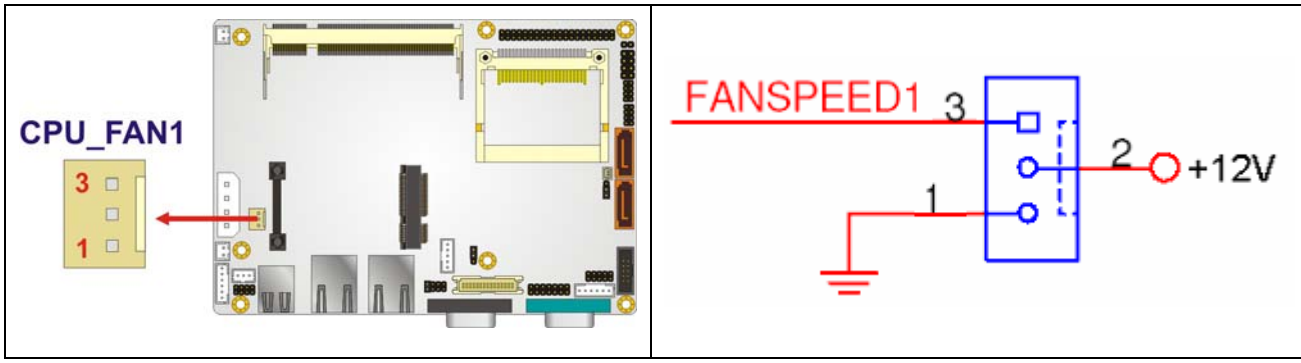


Figure 4-8: +12V Fan Connector Location

PIN NO.	DESCRIPTION
1	GND
2	+12V
3	Fan Speed Detect

Table 4-9: +12V Fan Connector Pinouts

4.3.8 Keyboard/Mouse Connector

CN Label: **KB_MS1**

CN Type: 6-pin header (1x6)

CN Location: See **Figure 4-9**

CN Pinouts: See **Table 4-10**

The keyboard and mouse connector can be connected to a standard PS/2 cable or PS/2 Y-cable to add keyboard and mouse functionality to the system.

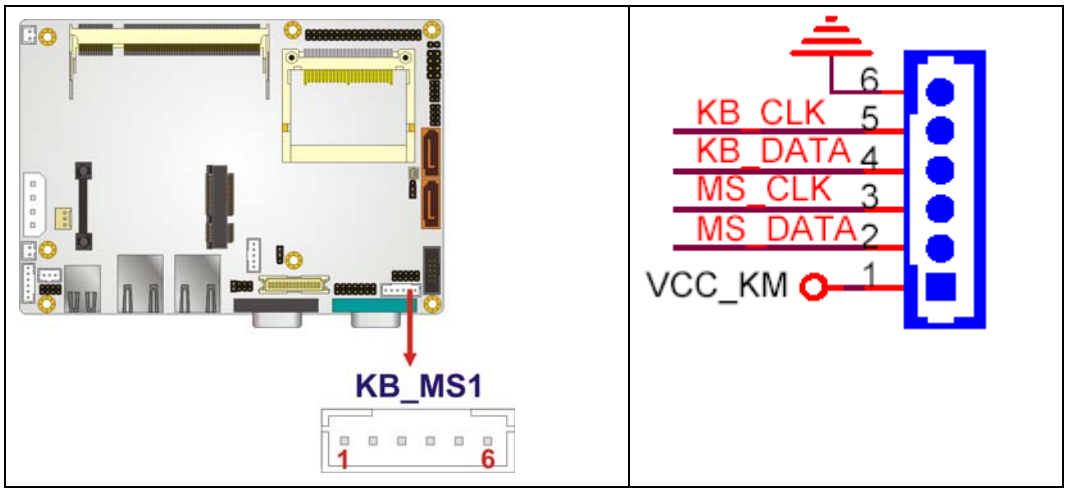


Figure 4-9: Keyboard/Mouse Connector Location

PIN NO.	DESCRIPTION
1	+5V KB DATA
2	MS DATA
3	MS CLK
4	KB DATA
5	KB CLK
6	GROUND

Table 4-10: Keyboard/Mouse Connector Pinouts

4.3.9 LED Connector

CN Label: **LED_C1**

CN Type: 6-pin wafer (1x6)

CN Location: See **Figure 4-10**

CN Pinouts: See **Table 4-11**

The LED connector connects to an HDD indicator LED and a power LED on the system chassis to inform the user about HDD activity and the power on/off status of the system.

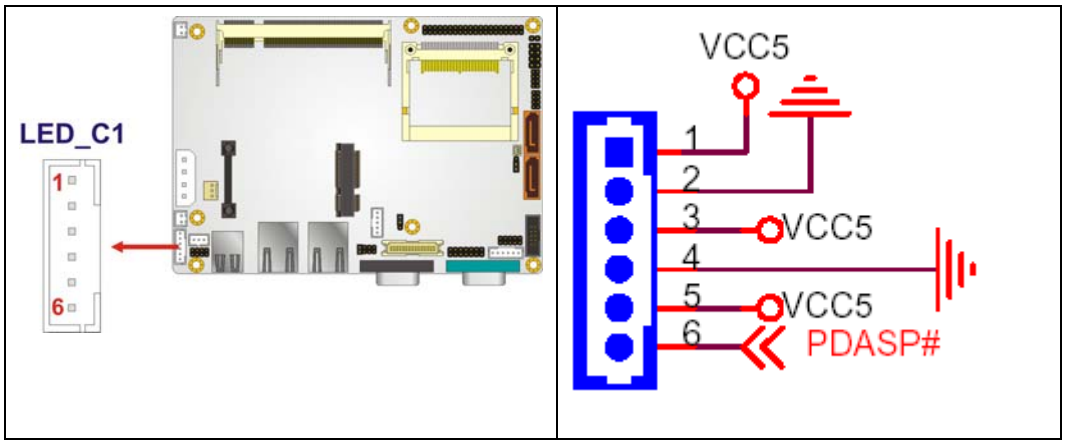


Figure 4-10: LED Connector Locations

PIN NO.	DESCRIPTION
1	+5V
2	GND
3	Power LED+
4	Power LED-
5	HDD LED+
6	HDD LED-

Table 4-11: LED Connector Pinouts

4.3.10 LVDS LCD Connector

CN Label: LVDS1

CN Type: 30-pin crimp (2x10)

CN Location: See Figure 4-11

CN Pinouts: See Table 4-12

The 30-pin LVDS LCD connector can be connected to single channel or dual channel, 18-bit or 36-bit LVDS panel.

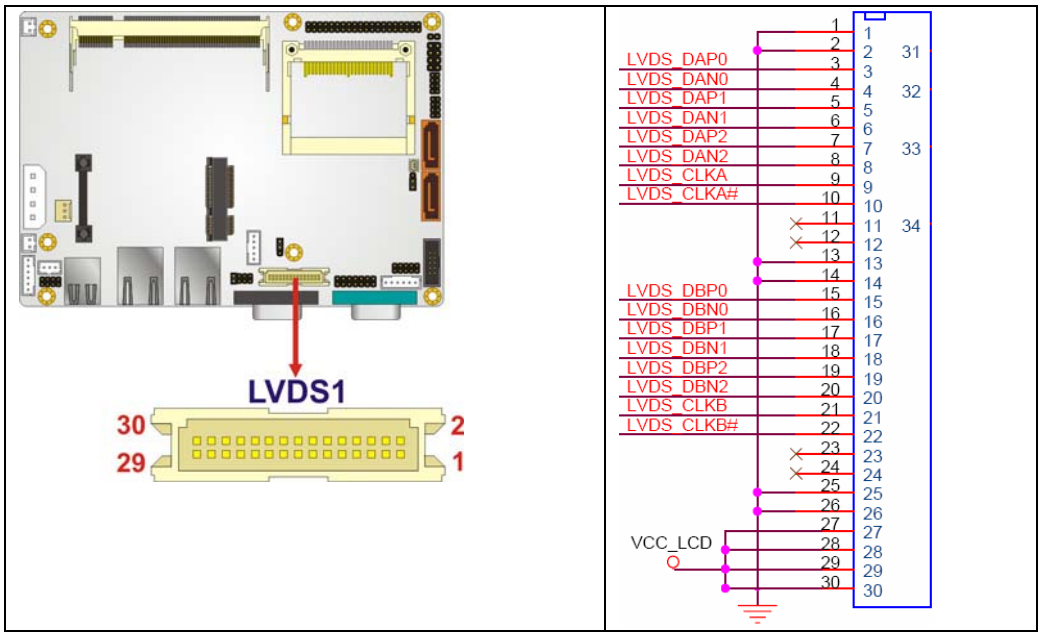


Figure 4-11: LVDS LCD Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND1	2	GND2
3	A_Y0	4	A_Y0#
5	A_Y1	6	A_Y1#
7	A_Y2	8	A_Y2#
9	A_CK	10	A_CK#
11	NC	12	NC
13	GND3	14	GND4
15	B_Y0	16	B_Y0#
17	B_Y1	18	B_Y1#
19	B_Y2	20	B_Y2#
21	B_CK	22	B_CK#
23	NC	24	NC
25	GND5	26	GND6
27	VCC_LCD	28	VCC_LCD
29	VCC_LCD	30	VCC_LCD

Table 4-12: LVDS LCD Port Connector Pinouts

4.3.11 PCIe Mini Card Slot

CN Label: CN4

CN Type: 52-pin Mini PCIe Card Slot

CN Location: See Figure 4-12

CN Pinouts: See Table 4-13

The PCIe mini card slot enables a PCIe mini card expansion module to be connected to the board. Cards supported include among others wireless LAN (WLAN) cards.

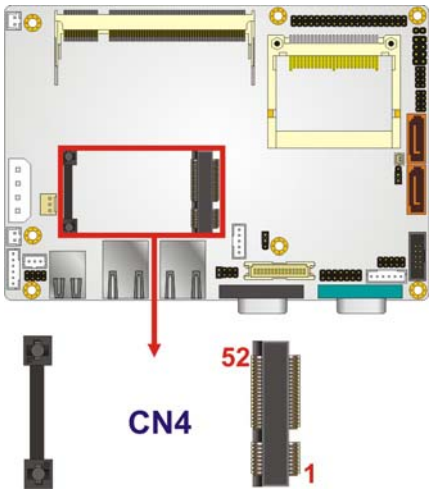


Figure 4-12: PCIe Mini Card Slot Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	1.5V
7	CLKREQ#	8	LFRAME#
9	GND	10	LAD3
11	CLK-	12	LAD2
13	CLK+	14	LAD1
15	GND	16	LAD0

17	PCIRST#	18	GND
19	LPC	20	VCC3
21	GND	22	PCIRST#
23	PERN2	24	3VDual
25	PERP2	26	GND
27	GND	28	1.5V
29	GND	30	SMBCLK
31	PETN2	32	SMBDATA
33	PETP2	34	GND
35	GND	36	USBD-
37	N/C	38	USBD+
39	N/C	40	GND
41	N/C	42	N/C
43	N/C	44	RF_LINK#
45	N/C	46	BLUELED#
47	N/C	48	1.5V
49	N/C	50	GND
51	N/C	52	VCC3

Table 4-13: PCIe Mini Card Slot Pinouts

4.3.12 Power Button Connector

CN Label: **PWRBTN1**

CN Type: 2-pin wafer (1x2)

CN Location: See **Figure 4-13**

CN Pinouts: See **Table 4-14**

The power button connector is connected to a power switch on the system chassis to enable users to turn the system on and off.

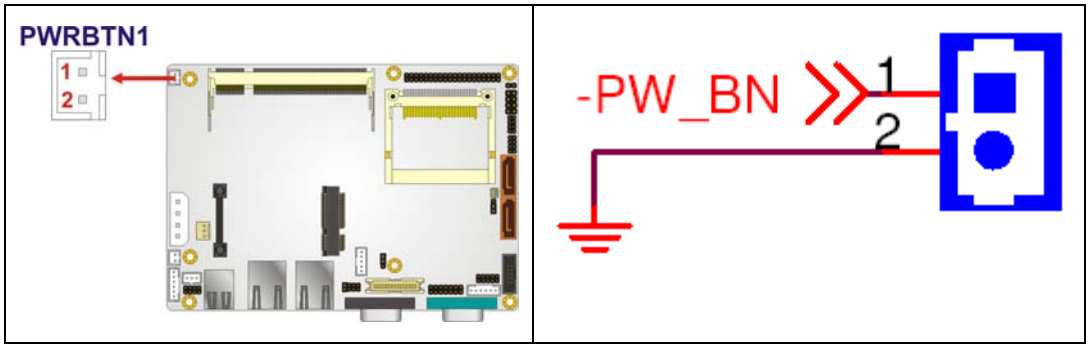


Figure 4-13: Power Button Connector Location

PIN NO.	DESCRIPTION
1	Power Switch
2	GND

Table 4-14: Power Button Connector Pinouts

4.3.13 Reset Button Connector

CN Label: **RESET1**

CN Type: 2-pin wafer (1x2)

CN Location: See **Figure 4-14**

CN Pinouts: See **Table 4-15**

The reset button connector is connected to a reset switch on the system chassis to enable users to reboot the system when the system is turned on.

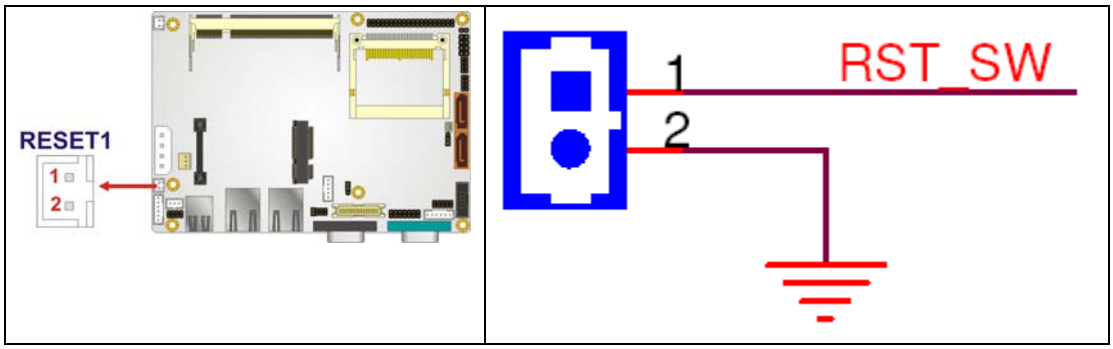


Figure 4-14: Reset Button Connector Locations

PIN NO.	DESCRIPTION
1	Reset Switch
2	GND

Table 4-15: Reset Button Connector Pinouts

4.3.14 SATA Drive Connectors

CN Label: SATA1, SATA2

CN Type: 7-pin SATA drive connectors

CN Location: See Figure 4-15

CN Pinouts: See Table 4-16

The four SATA drive connectors are each connected to a first generation SATA drive. First generation SATA drives transfer data at speeds as high as 150Mb/s. The SATA drives can be configured in a RAID configuration.

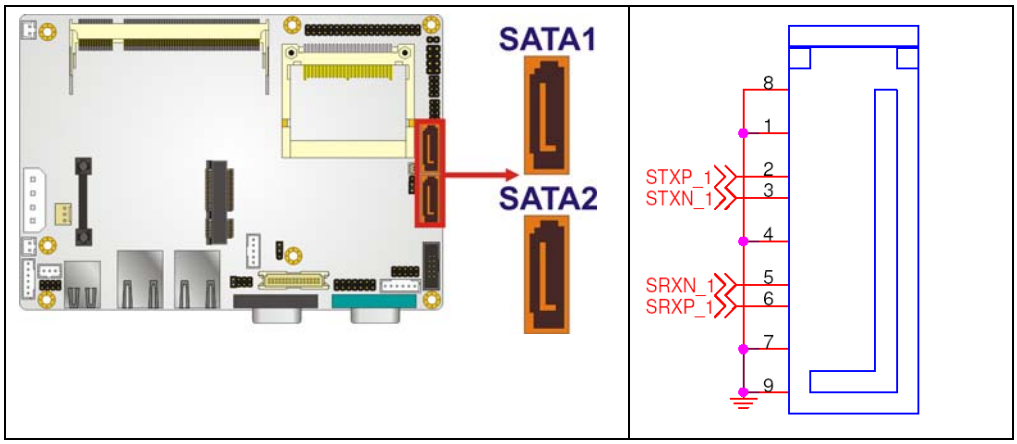


Figure 4-15: SATA Drive Connector Locations

PIN NO.	DESCRIPTION
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

Table 4-16: SATA Drive Connector Pinouts

4.3.15 Serial Port Connector (COM3, COM4, COM5 and COM6)

CN Label: **COM**

CN Type: 40-pin header (2x20)

CN Location: See Figure 4-16

CN Pinouts: See Table 4-17

The 40-pin serial port connector contains the following four serial ports: COM3, COM4, COM5 and COM6. All these serial ports are RS-232 serial communications channels. The serial port locations are specified below.

- COM3 is located on pin 1 to pin 10
- COM4 is located on pin 11 to pin 20
- COM5 is located on pin 21 to pin 30
- COM6 is located on pin 31 to pin 40

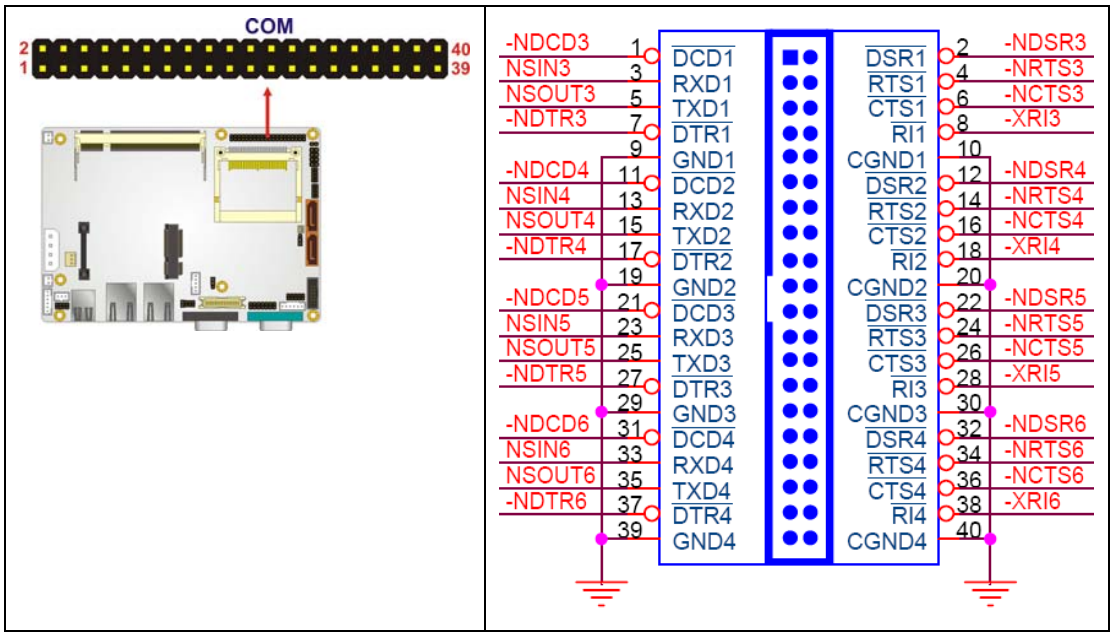


Figure 4-16: COM3 to COM6 Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DATA CARRIER DETECT (DCD3)	2	DATA SET READY (DSR3)
3	RECEIVE DATA (RXD3)	4	REQUEST TO SEND (RTS3)
5	TRANSMIT DATA (TXD3)	6	CLEAR TO SEND (CTS3)
7	DATA TERMINAL READY (DTR3)	8	RING INDICATOR (RI3)
9	GND	10	GND
11	DATA CARRIER DETECT (DCD4)	12	DATA SET READY (DSR4)
13	RECEIVE DATA (RXD4)	14	REQUEST TO SEND (RTS4)
15	TRANSMIT DATA (TXD4)	16	CLEAR TO SEND (CTS4)
17	DATA TERMINAL READY (DTR4)	18	RING INDICATOR (RI4)
19	GND	20	GND
21	DATA CARRIER DETECT (DCD5)	22	DATA SET READY (DSR5)
23	RECEIVE DATA (RXD5)	24	REQUEST TO SEND (RTS5)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
25	TRANSMIT DATA (TXD5)	26	CLEAR TO SEND (CTS5)
27	DATA TERMINAL READY (DTR5)	28	RING INDICATOR (RI5)
29	GND	30	GND
31	DATA CARRIER DETECT (DCD6	32	DATA SET READY (DSR6)
33	RECEIVE DATA (RXD6)	34	REQUEST TO SEND (RTS6)
35	TRANSMIT DATA (TXD6	36	CLEAR TO SEND (CTS6)
37	DATA TERMINAL READY (DTR6	38	RING INDICATOR (RI6)
39	GND	40	GND

Table 4-17: COM3 to COM6 Connector Pinouts

4.3.16 Serial Port Connector (COM 2)(RS-232, RS-422 or RS-485)

CN Label: COM2

CN Type: 14-pin header (2x7)

CN Location: See Figure 4-17

CN Pinouts: See Table 4-18

The 14-pin serial port connector connects to the COM2 serial communications channels. COM2 is a multi function channel. In default mode COM2 is an RS-232 serial communication channel but, with the COM2 function select jumper, can be configured as either an RS-422 or RS-485 serial communications channel.

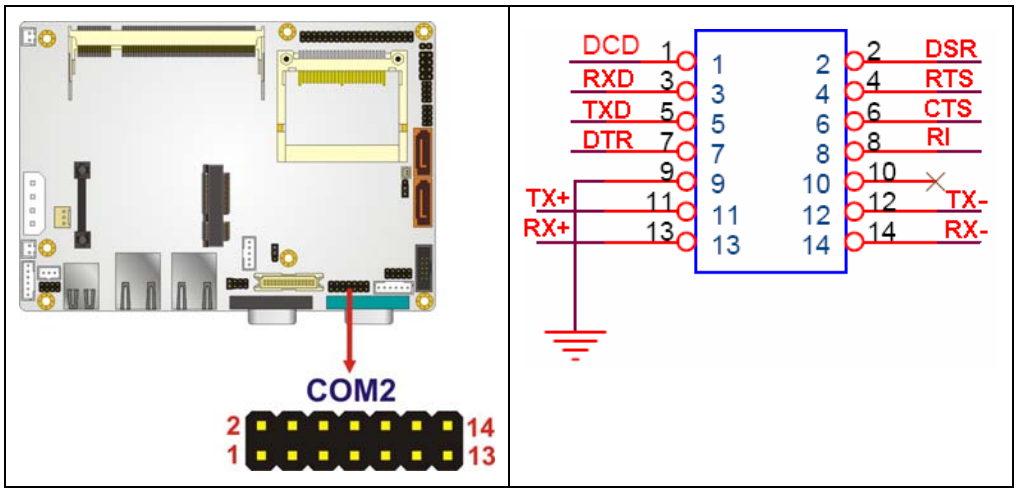


Figure 4-17: RS-232/422/485 Serial Port Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	NDCD	2	NDSR2
3	NRX	4	NRTS2
5	NTX	6	NCTS2
7	NDTR	8	NRI2
9	GND	10	GND
11	TXD485+	12	TXD485-
13	RXD485+	14	RXD485-

Table 4-18: RS-232/RS-485 Serial Port Connector Pinouts

4.3.17 USB Connectors (Internal)

CN Label: USB01 and USB23

CN Type: 8-pin header (2x4)

CN Location: See Figure 4-18

CN Pinouts: See Table 4-19

The 2x4 USB pin connectors each provide connectivity to two USB 1.1 or two USB 2.0 ports. Each USB connector can support two USB devices. Additional external USB ports are found on the rear panel. The USB ports are used for I/O bus expansion.

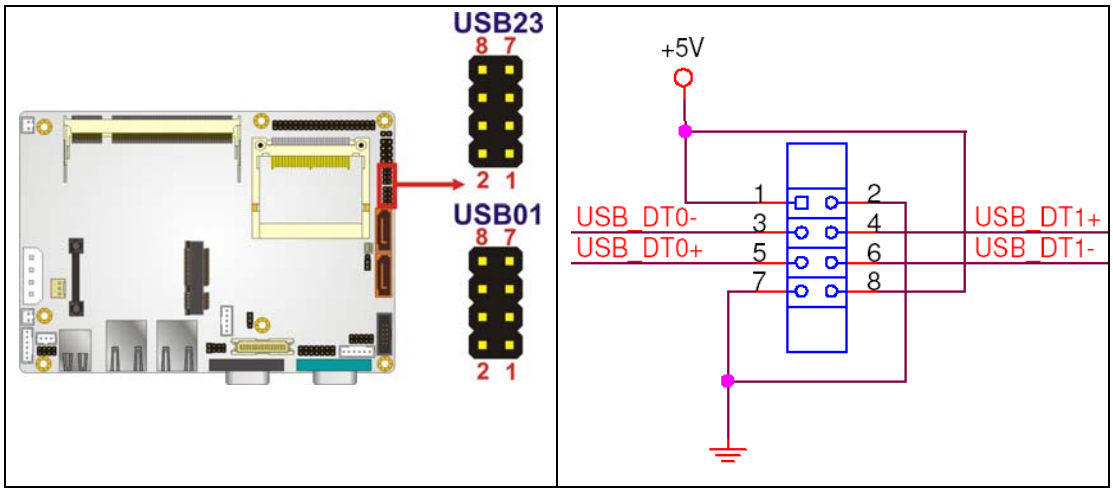


Figure 4-18: USB Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	GND
3	DATA-	4	DATA+
5	DATA+	6	DATA-
7	GND	8	VCC

Table 4-19: USB Port Connector Pinouts

4.4 External Peripheral Interface Connector Panel

Figure 4-19 shows the WAFER-945GSE external peripheral interface connector (EPIC) panel. The WAFER-945GSE EPIC panel consists of the following:

- 2 x RJ-45 LAN connectors
- 1 x Serial port connectors
- 2 x USB connectors
- 1 x VGA connector

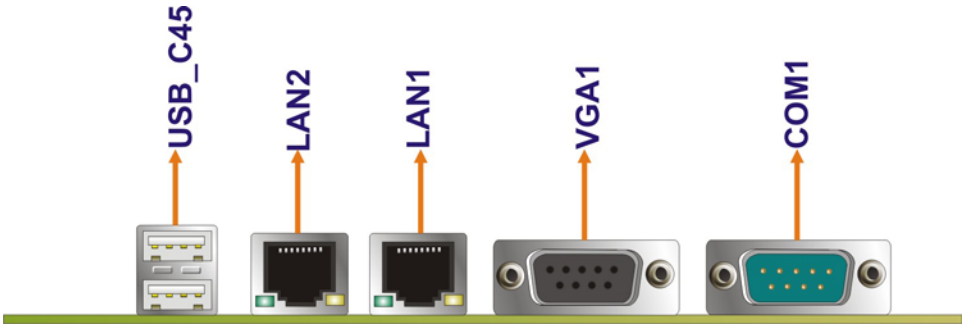


Figure 4-19: WAFER-945GSE External Peripheral Interface Connector

4.4.1 LAN Connectors

CN Label: LAN1 and LAN2

CN Type: RJ-45

CN Location: See Figure 4-19

CN Pinouts: See Table 4-20

The WAFER-945GSE is equipped with two built-in RJ-45 Ethernet controllers. The controllers can connect to the LAN through two RJ-45 LAN connectors. There are two LEDs on the connector indicating the status of LAN. The pin assignments are listed in the following table:

PIN	DESCRIPTION	PIN	DESCRIPTION
1	MDIA3-	5	MDIA1+
2	MDIA3+	6	MDIA2+
3	MDIA2-	7	MDIA0-
4	MDIA1-	8	MDIA0+

Table 4-20: LAN Pinouts

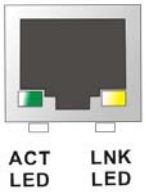


Figure 4-20: RJ-45 Ethernet Connector

The RJ-45 Ethernet connector has two status LEDs, one green and one yellow. The green LED indicates activity on the port and the yellow LED indicates the port is linked. See **Table 4-21**.

STATUS	DESCRIPTION	STATUS	DESCRIPTION
GREEN	Activity	YELLOW	Linked

Table 4-21: RJ-45 Ethernet Connector LEDs

4.4.2 Serial Port Connector (COM1)

CN Label: COM1

CN Type: DB-9 connectors

CN Location: See Figure 4-19 (see 2)

CN Pinouts: See Table 4-22 and Figure 4-21

The 9-pin DB-9 serial port connectors are connected to RS-232 serial communications devices.

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	6	DSR
2	RX	7	RTS
3	TX	8	CTS
4	DTR	9	RI
5	GND		

Table 4-22: RS-232 Serial Port (COM 1) Pinouts

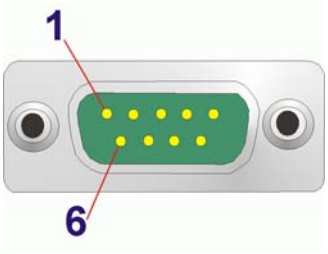


Figure 4-21: COM1 Pinout Locations

4.4.3 USB Connectors

CN Label: USB_C45

CN Type: Dual USB port

CN Location: See Figure 4-19

CN Pinouts: See Table 4-23

The WAFER-945GSE has two external USB 2.0 ports. The ports connect to both USB 2.0 and USB 1.1 devices.

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC (+5V)	5	VCC (+5V)
2	DATA4-	6	DATA5-
3	DATA4+	7	DATA5+
4	GND	8	GND

Table 4-23: USB Port Pinouts

4.4.4 VGA Connector

CN Label: VGA1

CN Type: 15-pin Female

CN Location: See Figure 4-19

CN Pinouts: See Figure 4-22 and Table 4-24

The WAFER-945GSE has a single 15-pin female connector for connectivity to standard display devices.

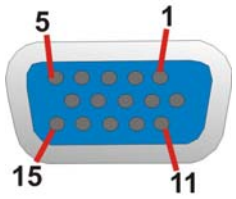


Figure 4-22: VGA Connector

PIN	DESCRIPTION	PIN	DESCRIPTION
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	CRT_PLUG-
7	GND	8	GND
9	VCC	10	GND
11	NC	12	DDC DAT

PIN	DESCRIPTION	PIN	DESCRIPTION
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 4-24: VGA Connector Pinouts

Chapter

5

Installation

5.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the WAFER-945GSE may result in permanent damage to the WAFER-945GSE and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-945GSE. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-945GSE, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***:- Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: When configuring the WAFER-945GSE, place it on an antic-static pad. This reduces the possibility of ESD damaging the WAFER-945GSE.
- ***Only handle the edges of the PCB***:-: When handling the PCB, hold the PCB by the edges.

5.2 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before the WAFER-945GSE is installed. All installation notices pertaining to the installation of the WAFER-945GSE should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the WAFER-945GSE and injury to the person installing the motherboard.

5.2.1 Installation Notices

WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the WAFER-945GSE, WAFER-945GSE components and injury to the user.

Before and during the installation please **DO** the following:

- Read the user manual:
  - The user manual provides a complete description of the WAFER-945GSE installation instructions and configuration options.
- Wear an electrostatic discharge cuff (ESD):
  - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- Place the WAFER-945GSE on an antistatic pad:
  - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- Turn all power to the WAFER-945GSE off:

- When working with the WAFER-945GSE, make sure that it is disconnected from all power supplies and that no electricity is being fed into the system.

Before and during the installation of the WAFER-945GSE **DO NOT:**

- Remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- Use the product before verifying all the cables and power connectors are properly connected.
- Allow screws to come in contact with the PCB circuit, connector pins, or its components.

5.2.2 Installation Checklist

The following checklist is provided to ensure the WAFER-945GSE is properly installed.

- All the items in the packing list are present
- A compatible memory module is properly inserted into the slot
- The CF Type I or CF Type II card is properly installed into the CF socket
- The jumpers have been properly configured
- The WAFER-945GSE is inserted into a chassis with adequate ventilation
- The correct power supply is being used
- The following devices are properly connected
  - SATA drives
  - Power supply
  - USB cable
  - Serial port cable
  - Keyboard and mouse cable
- The following external peripheral devices are properly connected to the chassis:
  - VGA screen
  - USB devices

5.3 Unpacking

When the WAFER-945GSE is unpacked, please check all the unpacking list items listed in Chapter 3 are indeed present. If any of the unpacking list items are not available please contact the WAFER-945GSE vendor reseller/vendor where the WAFER-945GSE was purchased or contact an IEI sales representative.

5.4 SO-DIMM and CF Card Installation

5.4.1 SO-DIMM Installation

WARNING:

Using incorrectly specified SO-DIMM may cause permanently damage the WAFER-945GSE. Please make sure the purchased SO-DIMM complies with the memory specifications of the WAFER-945GSE. SO-DIMM specifications compliant with the WAFER-945GSE are listed in **Chapter 2**.

To install a SO-DIMM into a SO-DIMM socket, please follow the steps below and refer to **Figure 5-1**.

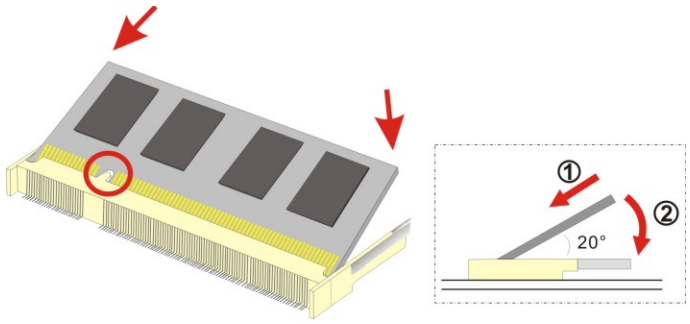


Figure 5-1: SO-DIMM Installation

Step 1: **Locate the SO-DIMM socket**. Place the WAFER-945GSE on an anti-static pad with the solder side facing up.

Step 2: **Align the SO-DIMM with the socket**. The SO-DIMM must be oriented in such a way that the notch in the middle of the SO-DIMM must be aligned with the plastic bridge in the socket.

Step 3: **Insert the SO-DIMM**. Push the SO-DIMM chip into the socket at an angle. (See **Figure 5-1**)

Step 4: **Open the SO-DIMM socket arms**. Gently pull the arms of the SO-DIMM socket out and push the rear of the SO-DIMM down. (See **Figure 5-1**)

Step 5: **Secure the SO-DIMM**. Release the arms on the SO-DIMM socket. They clip into place and secure the SO-DIMM in the socket.

5.4.2 CF Card Installation

NOTE:

The WAFER-945GSE can support both CF Type I cards and CF Type II cards. For the complete specifications of the supported CF cards please refer to **Chapter 2**.

To install the a CF card (Type 1 or Type 2) onto the WAFER-945GSE, please follow the steps below:

Step 1: **Locate the CF card socket**. Place the WAFER-945GSE on an anti-static pad with the solder side facing up. Locate the CF card.

Step 2: **Align the CF card**. Make sure the CF card is properly aligned with the CF socket.

Step 3: **Insert the CF card**. Gently insert the CF card into the socket making sure the socket pins are properly inserted into the socket. See **Figure 5-2**.

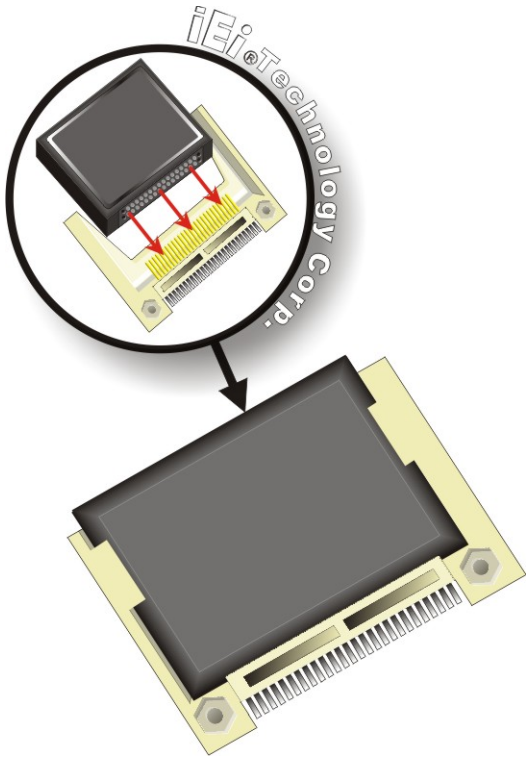


Figure 5-2: CF Card Installation

5.5 Jumper Settings

NOTE:

A jumper is a metal bridge used to close an electrical circuit. It consists of two or three metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To CLOSE/SHORT a jumper means connecting the pins of the jumper with the plastic clip and to OPEN a jumper means removing the plastic clip from a jumper.

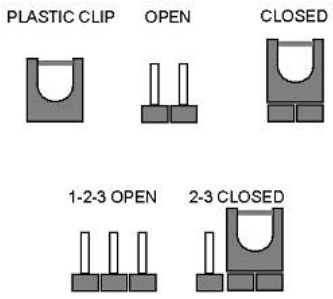


Figure 5-3: Jumper Locations

Before the WAFER-945GSE is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the WAFER-945GSE are listed in **Table 5-1**.

Description	Label	Type
AT Power Mode Setting	ATXCTL1	2-pin header
CF Card Setting	JCF1	2-pin header
Clear CMOS	J_CMOS1	3-pin header
COM2 Mode Setting	JP1	6-pin header
LVDS1 Panel Resolution	J_LCD_TYPE1	8-pin header
LVDS1 Voltage Select	J_VLVDS1	3-pin header

Table 5-1: Jumpers

5.5.1 AT Power Select Jumper Settings

NOTE:

The AT Power Select Jumper is the same as the ATX Enable connector.

Jumper Label: **ATXCTl1**

Jumper Type: 3-pin header

Jumper Settings: See **Table 5-2**

Jumper Location: See Figure 5-4

The AT Power Select jumper specifies the systems power mode as AT or ATX. Use a jumper cap to short pin 1 - pin 2 on the ATXCTL1 connector to enable the AT Power mode on the system. In the ATX mode use the PS_ON- and 5VSB cable. AT Power Select jumper settings are shown in **Table 5-2**.

AT Power Select	Description	
Short 2 – 3	Use AT power	Default
OFF	Use ATX power	

Table 5-2: AT Power Select Jumper Settings

The location of the AT Power Select jumper is shown in Figure 5-4 below.

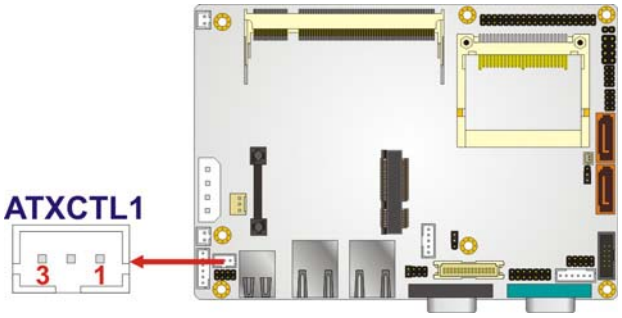


Figure 5-4: AT Power Select Jumper Location

5.5.2 CF Card Setup

Jumper Label: JCF1

Jumper Type: 2-pin header

Jumper Settings: See Table 5-3

Jumper Location: See Figure 5-5

The CF Card Setup jumper sets the CF Type I card or CF Type II cards as either the slave device or the master device. CF Card Setup jumper settings are shown in Table 5-3.

CF Card Setup	Description	
OFF	Slave	Default
Short 1-2	Master	

Table 5-3: CF Card Setup Jumper Settings

The CF Card Setup jumper location is shown in Figure 5-5.

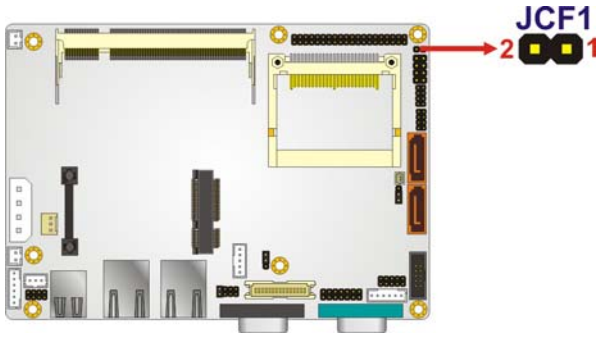


Figure 5-5: CF Card Setup Jumper Location

5.5.3 Clear CMOS Jumper

Jumper Label:	J_CMOS1
Jumper Type:	3-pin header
Jumper Settings:	See Table 5-4
Jumper Location:	See Figure 5-6

If the WAFER-945GSE fails to boot due to improper BIOS settings, the clear CMOS jumper clears the CMOS data and resets the system BIOS information. To do this, use the jumper cap to close pins 2 and 3 for a few seconds then reinstall the jumper clip back to pins 1 and 2.

If the “CMOS Settings Wrong” message is displayed during the boot up process, the fault may be corrected by pressing the F1 to enter the CMOS Setup menu. Do one of the following:

- Enter the correct CMOS setting
- Load Optimal Defaults
- Load Failsafe Defaults.

After having done one of the above, save the changes and exit the CMOS Setup menu.

The clear CMOS jumper settings are shown in **Table 5-4**.

AT Power Select	Description	
Short 1 - 2	Keep CMOS Setup	Default
Short 2 - 3	Clear CMOS Setup	

Table 5-4: Clear CMOS Jumper Settings

The location of the clear CMOS jumper is shown in **Figure 5-6** below.

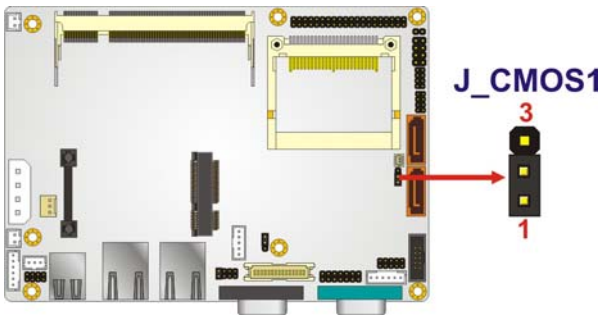


Figure 5-6: Clear CMOS Jumper

5.5.4 COM 2 Function Select Jumper

Jumper Label: **JP1**

Jumper Type: 8-pin header

Jumper Settings: See **Table 5-5**

Jumper Location: See **Figure 5-7**

The COM 2 Function Select jumper sets the communication protocol used by the second serial communications port (COM 2) as RS-232, RS-422 or RS-485. The COM 2 Function Select settings are shown in **Table 5-5**.

COM 2 Function Select	Description	
Short 1-2	RS-232	Default
Short 3-4	RS-422	
Short 5-6	RS-485	

Short 5-6 Short 7-8	RS-485 with RTS control	

Table 5-5: COM 2 Function Select Jumper Settings

The COM 2 Function Select jumper location is shown in **Figure 5-7**.

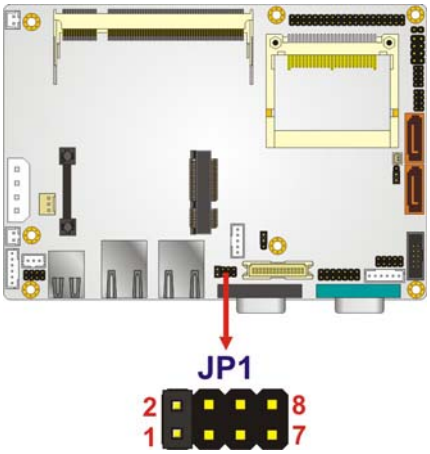


Figure 5-7: COM 2 Function Select Jumper Location

5.5.5 LVDS1 Panel Resolution Jumper

Jumper Label: **J_LCD_TYPE1**

Jumper Type: 8-pin header

Jumper Settings: See Table 5-6

Jumper Location: See Figure 5-8

The LVDS1 Panel Resolution jumper allows the resolution of the LVDS screens connected to the LVDS1 connector to be configured. The LVDS1 Panel Resolution jumper settings are shown in Table 5-6.

J_LCD_TYPE1				DESCRIPTION
Pin 7- Pin 8	Pin 5- Pin 6	Pin 3- Pin 4	Pin 1-Pin 2	
OFF	OFF	OFF	OFF	640 x 480 18-bit
OFF	OFF	OFF	ON	800 x 480 18-bit
OFF	OFF	ON	OFF	800 x 600 18-bit (Default)
OFF	OFF	ON	ON	1024 x 768 18-bit
OFF	ON	OFF	OFF	1280 x 1024 36-bit
OFF	ON	OFF	ON	1400 x 1050 36-bit
OFF	ON	ON	OFF	1400 x 900 36-bit
OFF	ON	ON	ON	1600 x 1200 36-bit

Table 5-6: LVDS Panel Resolution Jumper Settings

The LVDS Panel Resolution jumper location. is shown in Figure 5-8.

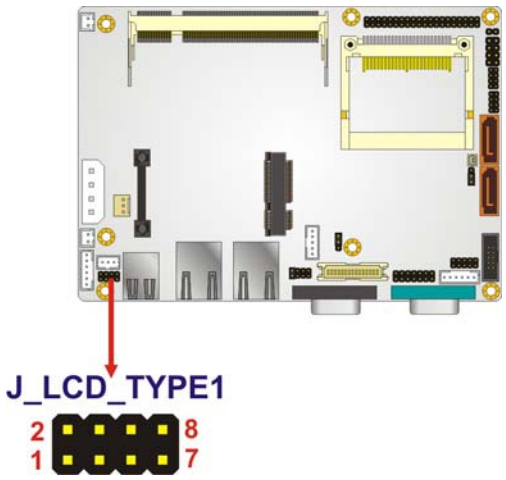


Figure 5-8:LVDS Panel Resolution Jumper Pinout Locations

5.5.6 LVDS Voltage Selection

WARNING:

Permanent damage to the screen and WAFER-945GSE may occur if the wrong voltage is selected with this jumper. Please refer to the user guide that cam with the monitor to select the correct voltage.

Jumper Label: **J_VLVDS1**

Jumper Type: 3-pin header

Jumper Settings: See **Table 5-7**

Jumper Location: See **Figure 5-9**

The **LVDS Voltage Selection** jumpers allow the LVDS screen voltages to be set. J_VLVDS1 sets the voltage connected to LVDS1 and J_VLVDS2 sets the voltage for the screen connected to LVDS2. The **LVDS Voltage Selection** jumper settings are shown in **Table 5-7**.

LCD Voltage Select	Description	
Short 1-2	+3.3V LVDS	Default
Short 2-3	+5V LVDS	

Table 5-7: LVDS Voltage Selection Jumper Settings

The LVDS Voltage Selection jumper location. is shown in **Figure 5-9**.

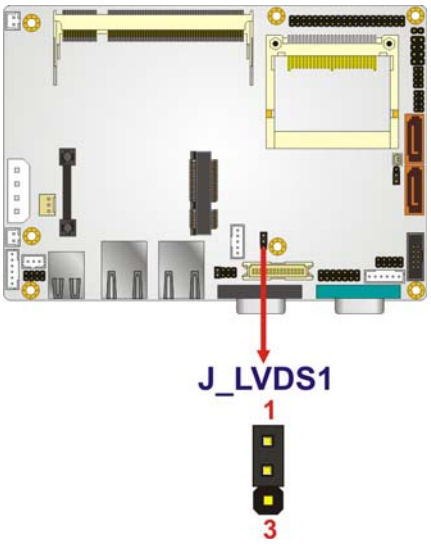


Figure 5-9: LVDS Voltage Selection Jumper Pinout Locations

5.6 Chassis Installation

5.6.1 Airflow

WARNING:

Airflow is critical to the cooling of the CPU and other onboard components. The chassis in which the WAFER-945GSE must have air vents to allow cool air to move into the system and hot air to move out.

The WAFER-945GSE must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.

NOTE:

IEI has a wide range of backplanes available. Please contact your WAFER-945GSE vendor, reseller or an IEI sales representative at sales@iei.com.tw or visit the IEI website (http://www.ieiworld.com.tw) to find out more about the available chassis.

5.6.2 Motherboard Installation

To install the WAFER-945GSE motherboard into the chassis please refer to the reference material that came with the chassis.

5.7 Internal Peripheral Device Connections

5.7.1 Peripheral Device Cables

The cables listed in **Table 5-8** are shipped with the WAFER-945GSE.

Quantity	Type
1	Keyboard and Mouse cable
2	SATA drive cable
1	Audio cable
1	RS-232 cable

Table 5-8: IEI Provided Cables

Some optional items that can be purchased separately and installed on the WAFER-945GSE include:

- Dual port USB cable
- RS-232/422/485 cable
- ATX power cable
- SATA power cable

- 4-COM port kit

5.7.2 SATA Drive Connection

The WAFER-945GSE is shipped with two SATA drive cables and one SATA drive power cable. To connect the SATA drives to the connectors, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the SATA drive connectors are shown in **Chapter 3**.

Step 2: **Insert the cable connector**. Press the clip on the connector at the end of the SATA cable and insert the cable connector into the onboard SATA drive connector. See **Figure 5-10**.

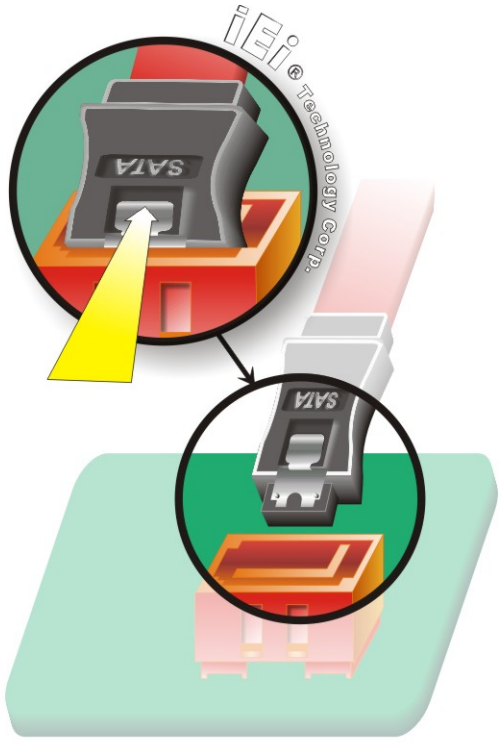


Figure 5-10: SATA Drive Cable Connection

Step 3: **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 5-11**.

NOTE:

The SATA power cable described below is an optional item and must be pre-ordered. The SATA power cable is not shipped with the system.

Step 4: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See **Figure 5-11**.

Figure 5-11: SATA Power Drive Connection

5.7.3 Serial Port Connector Cable (Four Ports) Cable Connection

The WAFER-945GSE is shipped with one four serial port connector cable. The four serial port connector cable connects four serial port connectors on the cable to the 40-pin serial port connectors on the WAFER-945GSE. To connect the four serial port connector cable please follow the steps below.

Step 1: **Locate the serial port connector**. The location of the 40-pin serial port connector is shown in **Chapter 3**.

Step 2: **Align the connectors**. Correctly align pin 1 on the cable connector with pin 1 on

the WAFER-945GSE 40-pin serial port connector. See **Figure 5-16**.

Step 3: **Insert the cable connectors** Once the cable connector is properly aligned with the 40-pin serial port connector on the WAFER-945GSE, connect the cable connector to the on-board connectors. See **Figure 5-16**.

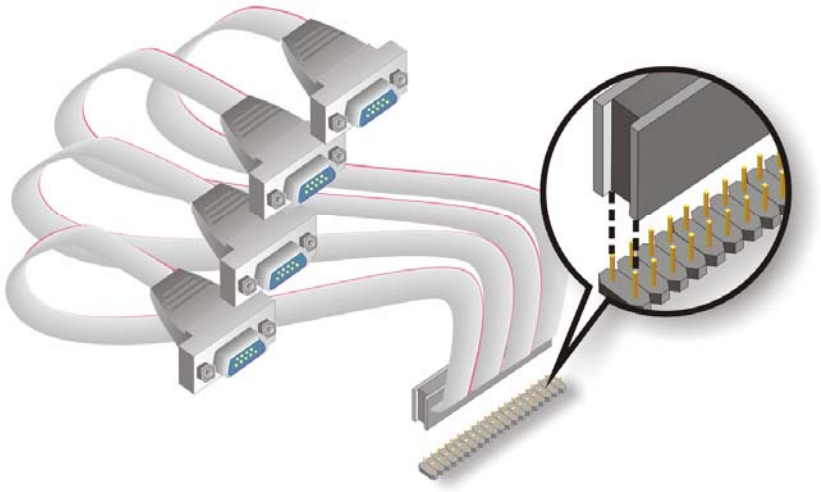


Figure 5-12: Four Serial Port Connector Cable Connection

Step 4: **Attach DB-9 serial port connectors to the chassis**. The four DB-9 serial port connectors can be inserted into four preformed holes in the chassis. Once, inserted the DB-9 connectors should be secured to the chassis with the retention screws.

5.7.4 Dual RS-232 Cable Connection (w/o bracket) (Optional)

The dual RS-232 cable consists of two connectors attached to two independent cables. Each cable is then attached to a D-sub 9-pin male connector. To install the dual RS-232 cable, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the RS-232 connectors are shown in

Chapter 3.

Step 2: **Insert the cable connectors**. Insert one connector into each serial port box headers. See **Figure 5-13**. A key on the front of the cable connectors ensures the connector can only be installed in one direction.

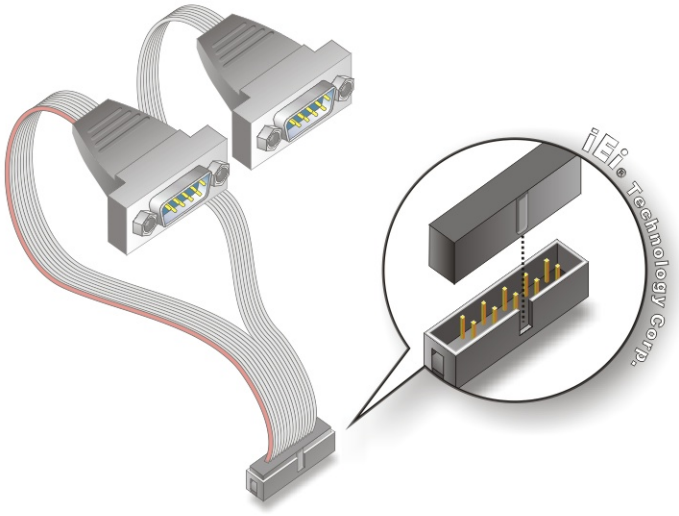


Figure 5-13: Dual RS-232 Cable Installation

Step 3: **Secure the connectors**. Both single RS-232 connectors have two retention screws that must be secured to a chassis or bracket.

Step 4: **Connect the serial device**. Once the single RS-232 connectors are connected to a chassis or bracket, a serial communications device can be connected to the system.

5.7.5 4-COM Port Adapter Board Connection (Optional)

An optional, separately purchased 4-COM port adapter board may be shipped with the WAFER-945GSE. To install the 4-COM Port Adapter Board, please follow the steps below.

Step 1: **Locate the COM connector**. The locations of the COM port connectors are shown in Chapter 4.

Step 2: **Insert the cable connector.** Align the cable connector with the onboard connector. Make sure the pin 1on the cable connector is properly aligned with pin 1 on the board connector. Figure 5-14.

Step 3: **Connect the adapter board to the cable.** The adapter board with the four COM ports must then be attached to the cable. Make sure the cable connector is properly aligned with the connector on the adapter board. Make sure the pin 1 on the adapter board connector and the cable connector are aligned. See Figure 5-14.

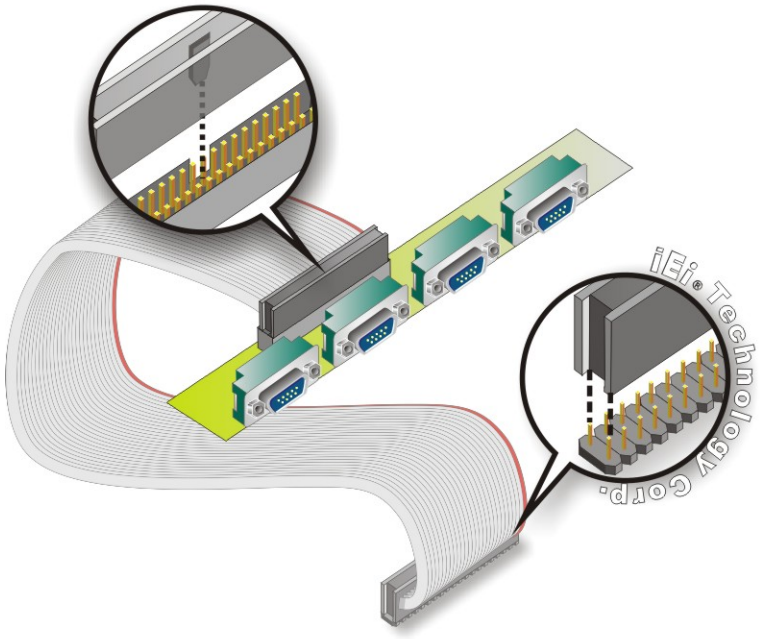


Figure 5-14: 4-COM Port Adapter Board

Step 4: **Secure the adapter board to the chassis**. Make sure the retention screws on either side of each COM port DB-9 connector are firmly secured to the chassis enclosure.

Step 5: **Insert the serial connector**. Insert the DB-9 connector of a serial device into the DB-9 connector on the external peripheral interface. See Figure 5-15.

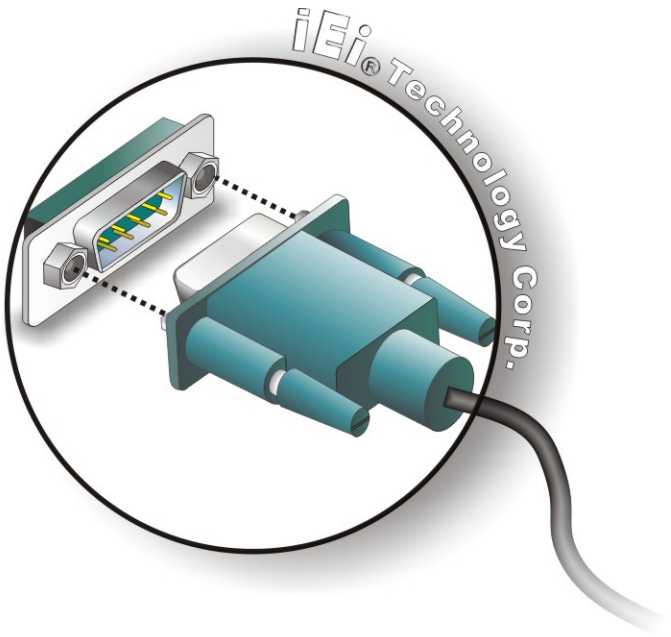


Figure 5-15: Serial Device Connector

5.7.6 Keyboard/Mouse Y-cable Connector

The WAFER-945GSE is shipped with a keyboard/mouse Y-cable connector. The keyboard/mouse Y-cable connector connects to a keyboard/mouse connector on the WAFER-945GSE and branches into two cables that are each connected to a PS/2 connector, one for a mouse and one for a keyboard. To connect the keyboard/mouse Y-cable connector please follow the steps below.

Step 1: **Locate the connector**. The location of the keyboard/mouse Y-cable connector is shown in **Chapter 3**.

Step 2: **Align the connectors**. Correctly align pin 1 on the cable connector with pin 1 on the WAFER-945GSE keyboard/mouse connector. See **Figure 5-16**.

Step 3: **Insert the cable connectors** Once the cable connector is properly aligned with the keyboard/mouse connector on the WAFER-945GSE, connect the cable

connector to the on-board connectors. See **Figure 5-16**.

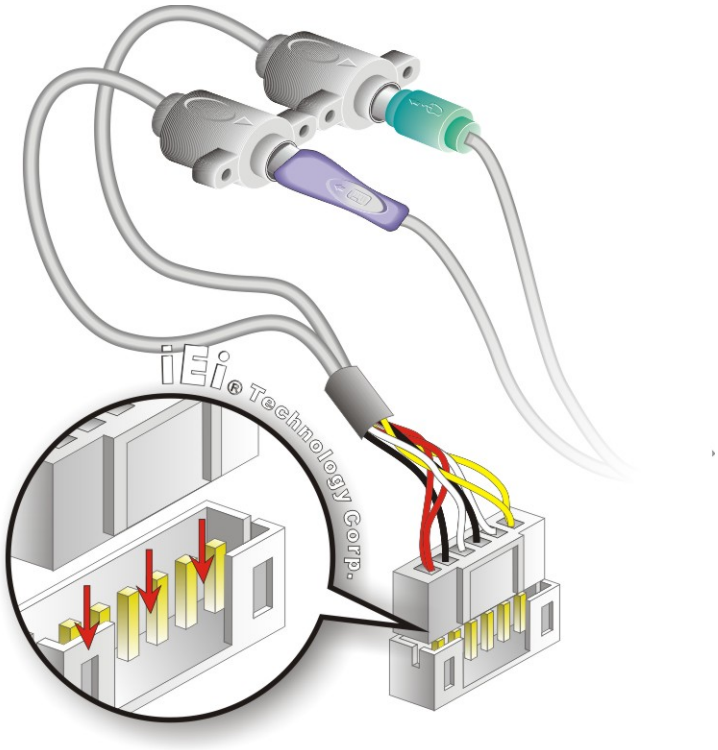


Figure 5-16: Keyboard/mouse Y-cable Connection

Step 4: **Attach PS/2 connectors to the chassis**. The keyboard/mouse Y-cable connector is connected to two PS/2 connectors. To secure the PS/2 connectors to the chassis please refer to the installation instructions that came with the chassis.

Step 5: **Connect the keyboard and mouse**. Once the PS/2 connectors are connected to the chassis, a keyboard and mouse can each be connected to one of the PS/2 connectors. The keyboard PS/2 connector and mouse PS/2 connector are both marked. Please make sure the keyboard and mouse are connected to the correct PS/2 connector.

5.7.7 Audio Kit Installation

The Audio Kit that came with the WAFER-945GSE connects to the 10-pin audio connector on the WAFER-945GSE. The audio kit consists of three audio jacks. One audio jack, Mic

In, connects to a microphone. The remaining two audio jacks, Line-In and Line-Out, connect to two speakers. To install the audio kit, please refer to the steps below:

Step 1: **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

Step 2: **Align pin 1**. Align pin 1 on the on-board connector with pin 1 on the audio kit connector. Pin 1 on the audio kit connector is indicated with a white dot. See **Figure 5-17**.

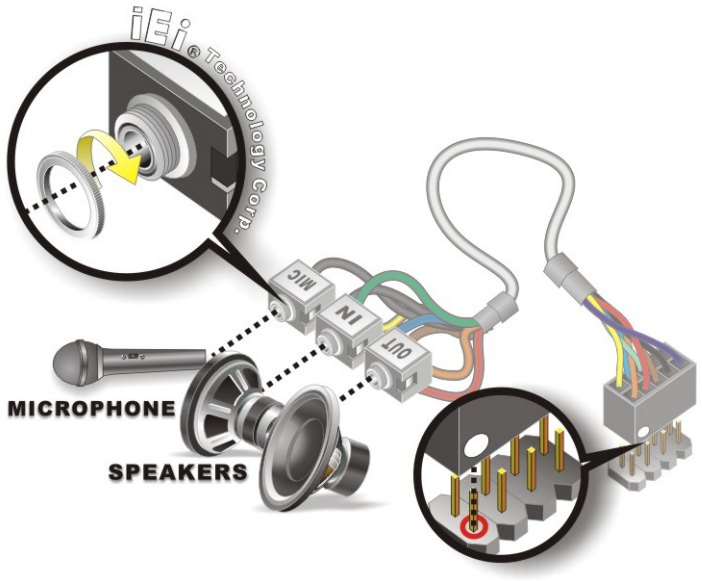


Figure 5-17: Audio Kit Cable Connection

Step 3: **Connect the audio devices**. Connect one speaker to the line-in audio jack, one speaker to the line-out audio jack and a microphone to the mic-in audio jack.

5.7.8 USB Cable (Dual Port without Bracket) (Optional)

The WAFER-945GSE is shipped with a dual port USB 2.0 cable. To connect the USB cable connector, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the USB connectors are shown in

Chapter 3.

WARNING:

If the USB pins are not properly aligned, the USB device can burn out.

Step 2: **Align the connectors**. The cable has two connectors. Correctly align pin 1on each cable connector with pin 1 on the WAFER-945GSE USB connector.

Step 3: **Insert the cable connectors**. Once the cable connectors are properly aligned with the USB connectors on the WAFER-945GSE, connect the cable connectors to the on-board connectors. See **Figure 5-18**.

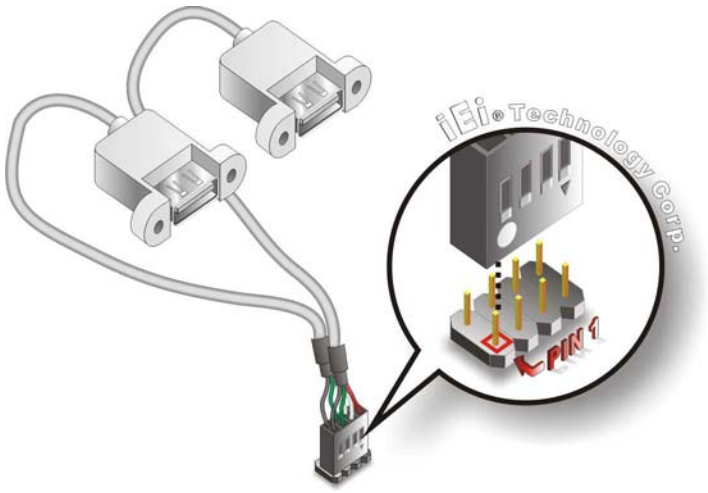


Figure 5-18: Dual USB Cable Connection

Step 4: **Attach the USB connectors to the chassis**. The USB 2.0 connectors each of two retention screw holes. To secure the connectors to the chassis please refer to the installation instructions that came with the chassis.

5.8 External Peripheral Interface Connection

The following external peripheral devices can be connected to the external peripheral interface connectors.

- RJ-45 Ethernet cable connectors
- Serial port devices
- USB devices
- VGA monitors

To install these devices, connect the corresponding cable connector from the actual device to the corresponding WAFER-945GSE external peripheral interface connector making sure the pins are properly aligned.

5.8.1 LAN Connection (Single Connector)

There are two external RJ-45 LAN connectors. The RJ-45 connectors enable connection to an external network. To connect a LAN cable with an RJ-45 connector, please follow the instructions below.

Step 1: **Locate the RJ-45 connectors**. The locations of the USB connectors are shown in **Chapter 4**.

Step 2: **Align the connectors.** Align the RJ-45 connector on the LAN cable with one of the RJ-45 connectors on the WAFER-945GSE. See **Figure 5-19**.

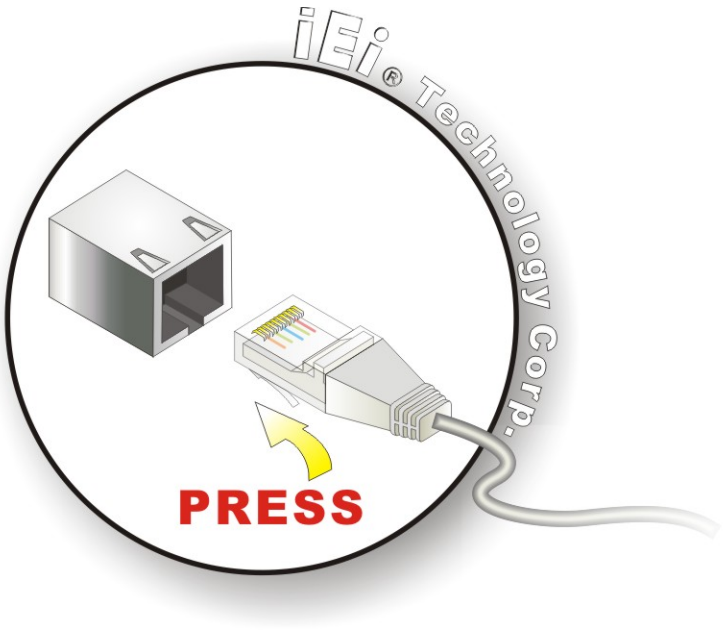


Figure 5-19: LAN Connection

Step 3: **Insert the LAN cable RJ-45 connector.** Once aligned, gently insert the LAN cable RJ-45 connector into the onboard RJ-45 connector.

5.8.2 Serial Device Connection

The WAFER-945GSE has a single female DB-9 connector on the external peripheral interface panel for a serial device. Follow the steps below to connect a serial device to the WAFER-945GSE.

Step 1: **Locate the DB-9 connector**. The location of the DB-9 connector is shown in **Chapter 3**.

Step 2: **Insert the serial connector**. Insert the DB-9 connector of a serial device into the DB-9 connector on the external peripheral interface. See Figure 5-20.

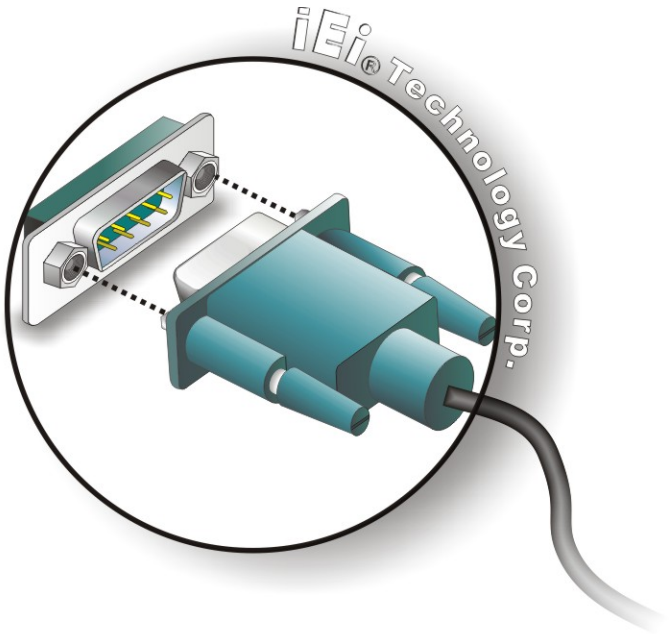


Figure 5-20: Serial Device Connector

Step 3: **Secure the connector**. Secure the serial device connector to the external interface by tightening the two retention screws on either side of the connector

5.8.3 USB Connection (Dual Connector)

The external USB Series "A" receptacle connectors provide easier and quicker access to external USB devices. Follow the steps below to connect USB devices to the WAFER-945GSE.

Step 1: **Locate the USB Series "A" receptacle connectors**. The location of the USB Series "A" receptacle connectors are shown in **Chapter 3**.

Step 2: **Insert a USB Series "A" plug**. Insert the USB Series "A" plug of a device into the USB Series "A" receptacle on the external peripheral interface. See **Figure 5-21**.

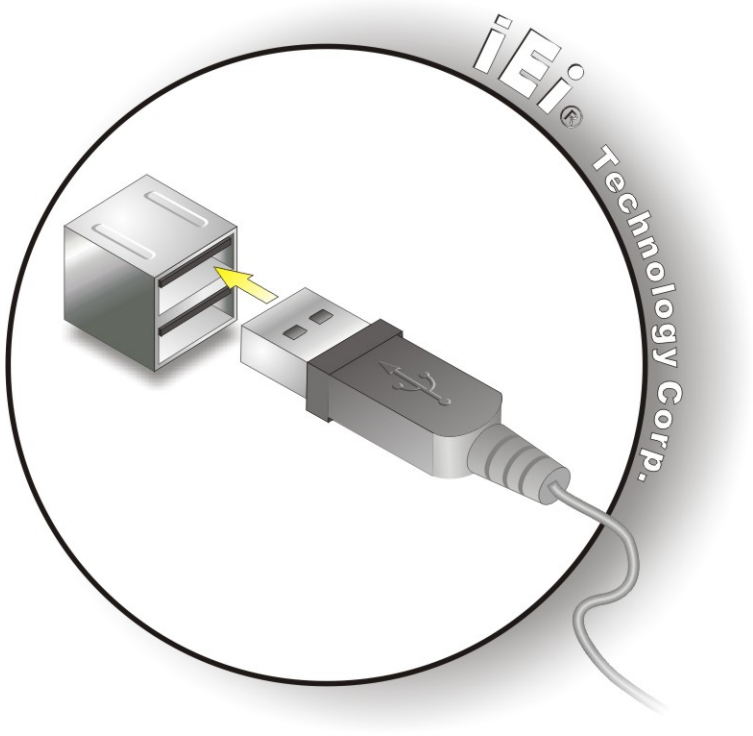


Figure 5-21: USB Connector

5.8.4 VGA Monitor Connection

The WAFER-945GSE has a single female DB-15 connector on the external peripheral interface panel. The DB-15 connector is connected to a CRT or VGA monitor. To connect a monitor to the WAFER-945GSE, please follow the instructions below.

Step 1: **Locate the female DB-15 connector**. The location of the female DB-15 connector is shown in **Chapter 3**.

Step 2: **Align the VGA connector**. Align the male DB-15 connector on the VGA screen cable with the female DB-15 connector on the external peripheral interface.

Step 3: **Insert the VGA connector**. Once the connectors are properly aligned with the insert the male connector from the VGA screen into the female connector on the WAFER-945GSE. See **Figure 5-22**.

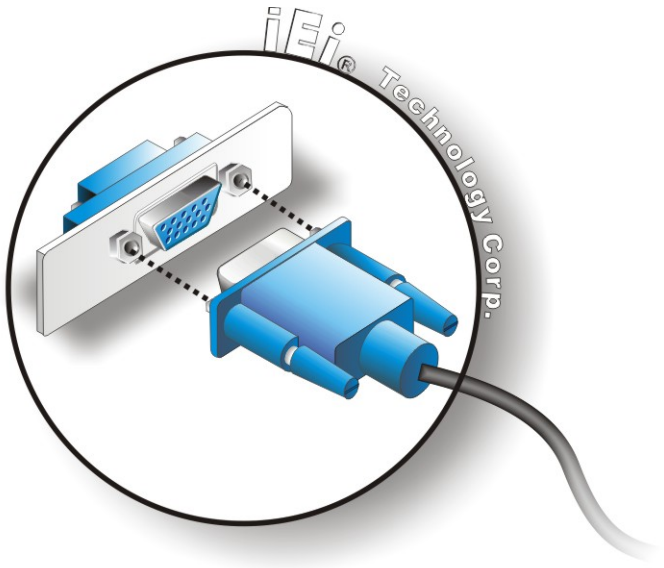


Figure 5-22: VGA Connector

Step 4: **Secure the connector**. Secure the DB-15 VGA connector from the VGA monitor to the external interface by tightening the two retention screws on either side of the connector.

5.9 Heat Sink Enclosure

WARNING:

Never run the WAFER-945GSE without the heat sink secured to the board. The heat sink ensures the system remains cool and does not need addition heat sinks to cool the system.

WARNING:

When running the WAFER-945GSE, do not put the WAFER-945GSE directly on a surface that can not dissipate system heat, especially the wooden or plastic desk. It is highly recommended to run the WAFER-945GSE

→ on a heat dissipation surface or

→ using copper pillars to hold the board up from the desk below

When the WAFER-945GSE is shipped it is secured to a heat sink with five retention screws. If the WAFER-945GSE must be removed from the heat sink, the five retention screws must be removed.

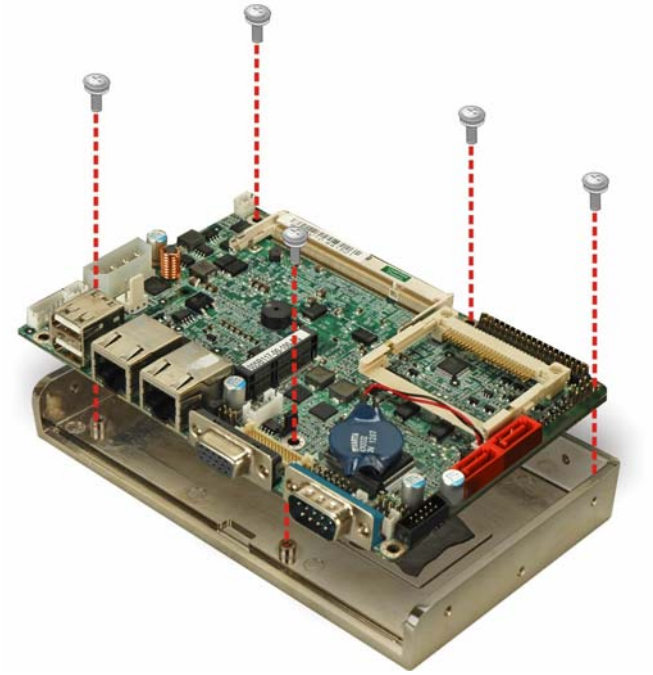


Figure 5-23: Heat Sink Retention Screws

Chapter

6

BIOS Screens

6.1 Introduction

A licensed copy of AMI BIOS is preprogrammed into the ROM BIOS. The BIOS setup program allows users to modify the basic system configuration. This chapter describes how to access the BIOS setup program and the configuration options that may be changed.

6.1.1 Starting Setup

The AMI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the **DELETE** key as soon as the system is turned on or
2. Press the **DELETE** key when the “**Press Del to enter SETUP**” message appears on the screen.

If the message disappears before the **DELETE** key is pressed, restart the computer and try again.

6.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **ESC** to quit. Navigation keys are shown in.

Key	Function
Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
Esc key	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
Page Up key	Increase the numeric value or make changes
Page Dn key	Decrease the numeric value or make changes

F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 /F3 key	Change color from total 16 colors. F2 to select color forward.
F10 key	Save all the CMOS changes, only for Main Menu

Table 6-1: BIOS Navigation Keys

6.1.3 Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

6.1.4 Unable to Reboot After Configuration Changes

If the computer cannot boot after changes to the system configuration is made, CMOS defaults. Use the jumper described in **Chapter 5**.

6.1.5 BIOS Menu Bar

The **menu bar** on top of the BIOS screen has the following main items:

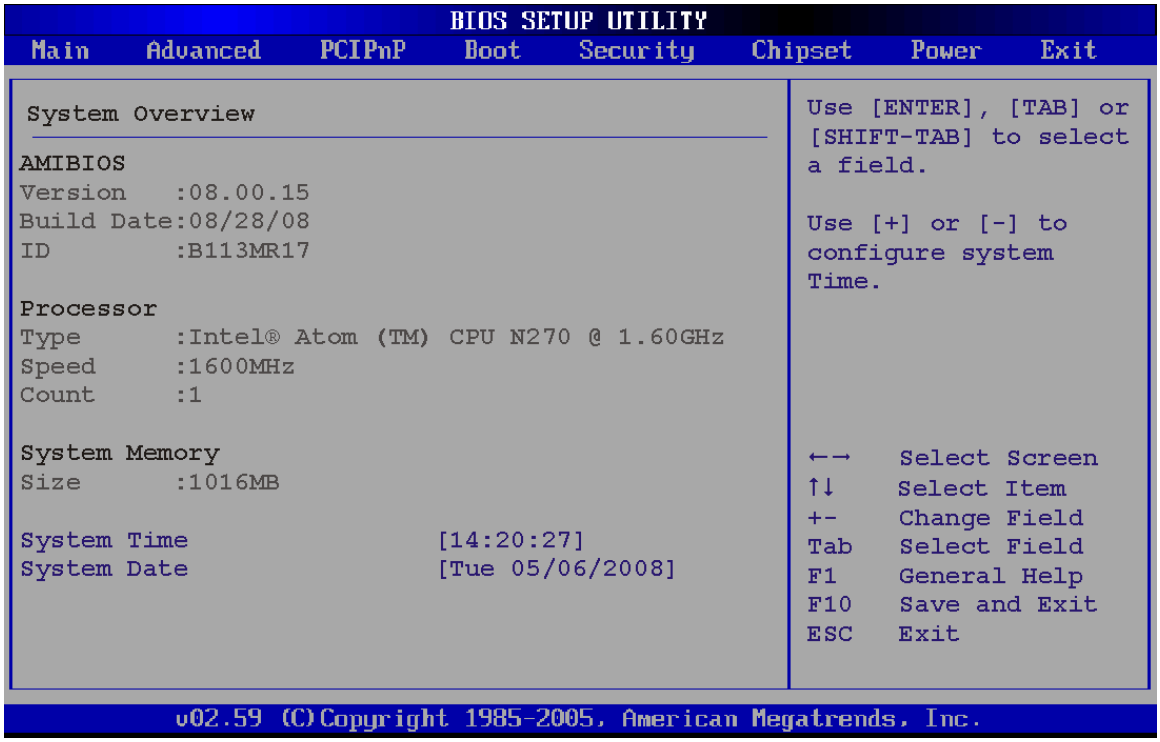
- **Main** Changes the basic system configuration.
- **Advanced** Changes the advanced system settings.
- **PCIPnP** Changes the advanced PCI/PnP Settings
- **Boot** Changes the system boot configuration.
- **Security** Sets User and Supervisor Passwords.
- **Chipset** Changes the chipset settings.
- **Power** Changes power management settings.
- **Exit** Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

6.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered.

The **Main** menu gives an overview of the basic system information.



BIOS Menu 1: Main

➔ System Overview

The **System Overview** lists a brief summary of different system components. The fields in **System Overview** cannot be changed. The items shown in the system overview include:

- **AMI BIOS**: Displays auto-detected BIOS information
  - Version: Current BIOS version
  - Build Date: Date the current BIOS version was made
  - ID: Installed BIOS ID
- **Processor**: Displays auto-detected CPU specifications
  - Type: Names the currently installed processor
  - Speed: Lists the processor speed

- Count: The number of CPUs on the motherboard

- **System Memory**: Displays the auto-detected system memory.
  - Size: Lists memory size

The System Overview field also has two user configurable fields:

➔ **System Time [xx:xx:xx]**

Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

➔ **System Date [xx/xx/xx]**

Use the **System Date** option to set the system date. Manually enter the day, month and year.

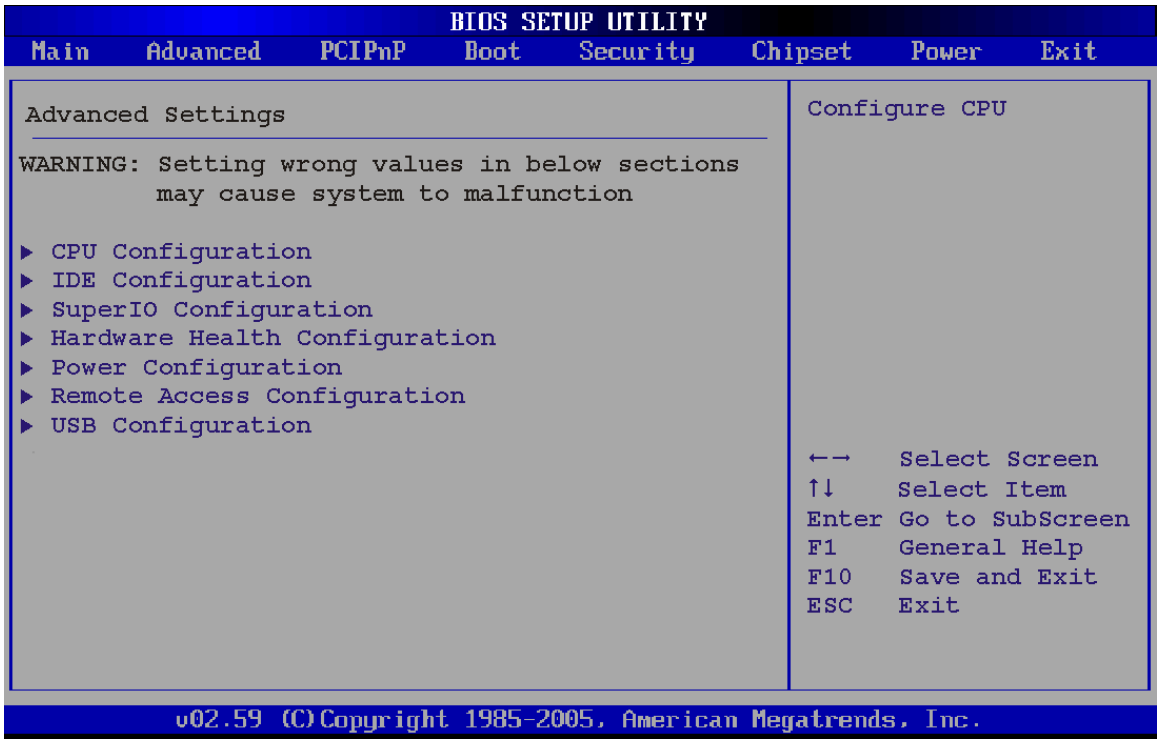
6.3 Advanced

Use the **Advanced** menu (**BIOS Menu 2**) to configure the CPU and peripheral devices through the following sub-menus:

WARNING:

Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.

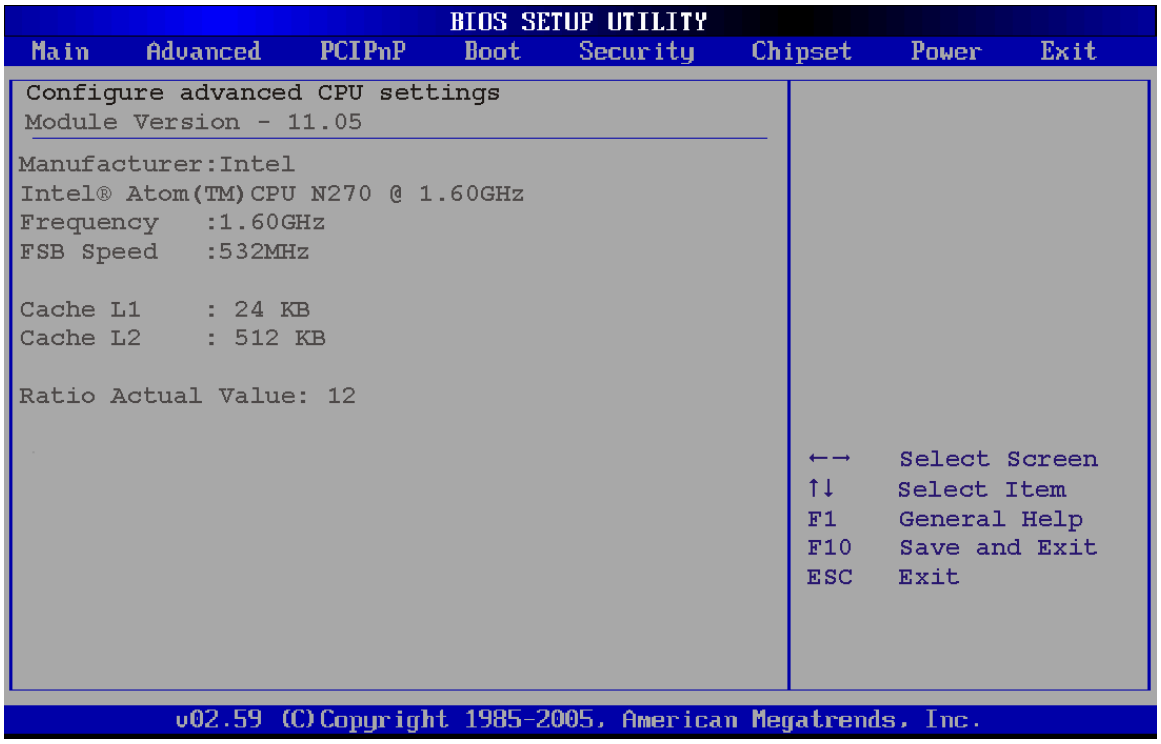
- CPU Configuration (see Section 6.3.1)
- IDE Configuration (see Section 6.3.2)
- SuperIO Configuration (see Section 6.3.3)
- Hardware Health Configuration (see Section)
- Power Configuration (see Section 6.3.5)
- Remote Access Configuration (see Section 6.3.5.2)
- USB Configuration (see Section 6.3.7)



BIOS Menu 2: Advanced

6.3.1 CPU Configuration

Use the **CPU Configuration** menu (BIOS Menu 3) to view detailed CPU specifications and configure the CPU.



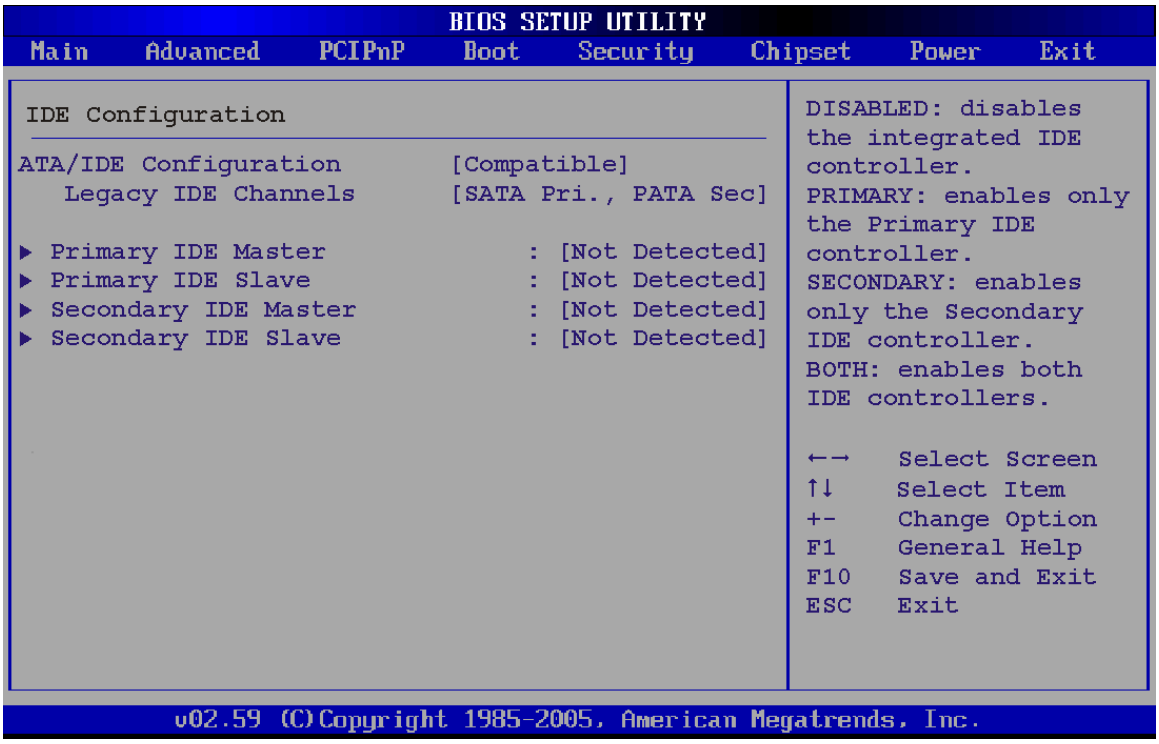
BIOS Menu 3: CPU Configuration

The CPU Configuration menu (BIOS Menu 3) lists the following CPU details:

- **Manufacturer**: Lists the name of the CPU manufacturer
- **Brand String**: Lists the brand name of the CPU being used
- **Frequency:** Lists the CPU processing speed
- **FSB Speed**: Lists the FSB speed
- **Cache L1**: Lists the CPU L1 cache size
- **Cache L2**: Lists the CPU L2 cache size

6.3.2 IDE Configuration

Use the **IDE Configuration** menu (**BIOS Menu 4**) to change and/or set the configuration of the IDE devices installed in the system.



BIOS Menu 4: IDE Configuration

➔ **ATA/IDE Configurations [Compatible]**

Use the **ATA/IDE Configurations** option to configure the ATA/IDE controller.

➔ **Disabled** Disables the on-board ATA/IDE controller.

➔ **Compatible** Configures the on-board ATA/IDE controller to be in compatible mode. In this mode, a SATA channel will replace one of the IDE channels. This mode supports up to 4 storage devices.

➔ **Enhanced** **DEFAULT** Configures the on-board ATA/IDE controller to be in Enhanced mode. In this mode, IDE channels and SATA channels are separated. This mode supports up to 6 storage devices. Some legacy OS do not support this mode.

➔ **Legacy IDE Channels [PATA Pri, SATA Sec]**

➔ **SATA Only**		Only the SATA drives are enabled.
➔ **SATA Pri, PATA Sec**	**DEFAULT**	The IDE drives are enabled on the Primary IDE channel. The SATA drives are enabled on the Secondary IDE channel.
➔ **PATA Only**		The IDE drives are enabled on the primary and secondary IDE channels. SATA drives are disabled.

➔ **IDE Master and IDE Slave**

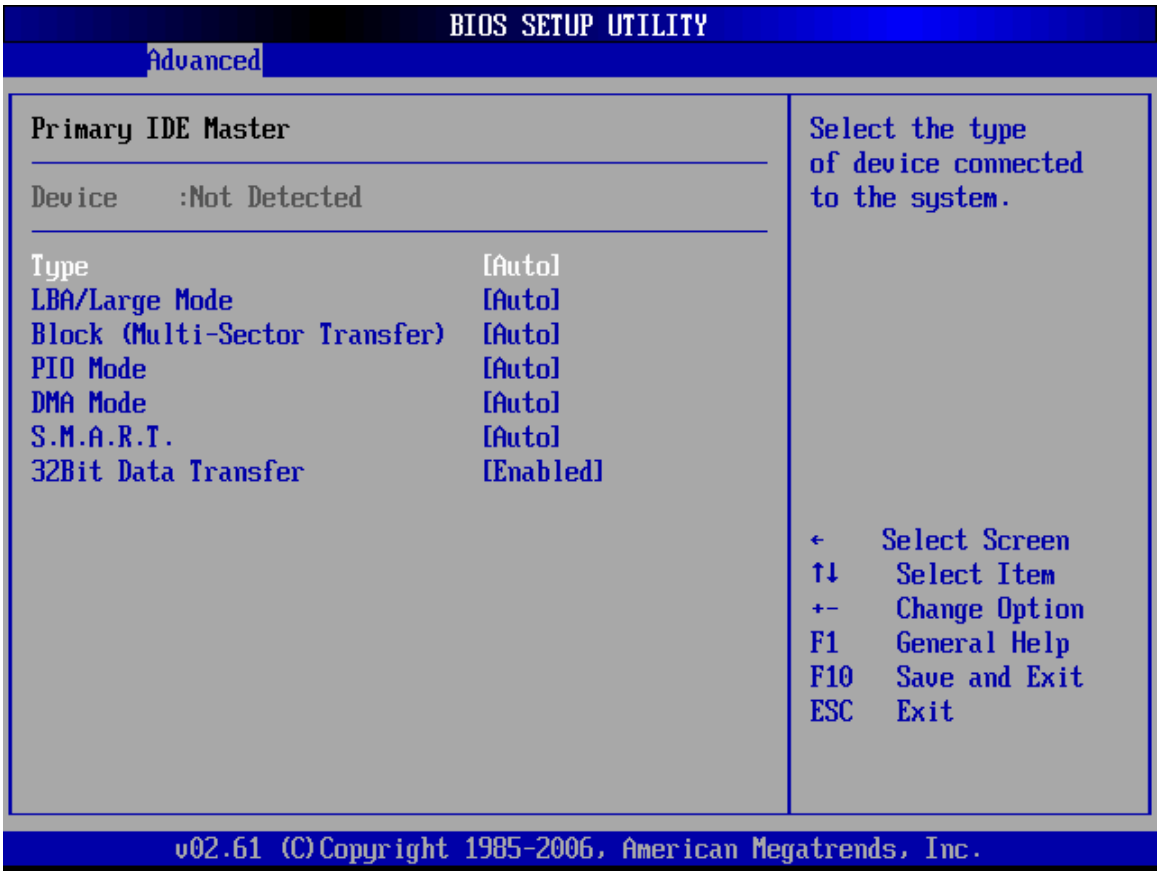
When entering setup, BIOS auto detects the presence of IDE devices. BIOS displays the status of the auto detected IDE devices. The following IDE devices are detected and are shown in the **IDE Configuration** menu:

- Primary IDE Master
- Primary IDE Slave
- Secondary IDE Master
- Secondary IDE Slave

The **IDE Configuration** menu (**BIOS Menu 4**) allows changes to the configurations for the IDE devices installed in the system. If an IDE device is detected, and one of the above listed four BIOS configuration options are selected, the IDE configuration options shown in **Section 6.3.2.1** appear.

6.3.2.1 IDE Master, IDE Slave

Use the **IDE Master** and **IDE Slave** configuration menu to view both primary and secondary IDE device details and configure the IDE devices connected to the system.



BIOS Menu 5: IDE Master and IDE Slave Configuration

➔ **Auto-Detected Drive Parameters**

The “grayed-out” items in the left frame are IDE disk drive parameters automatically detected from the firmware of the selected IDE disk drive. The drive parameters are listed as follows:

- **Device**: Lists the device type (e.g. hard disk, CD-ROM etc.)
- **Type**: Indicates the type of devices a user can manually select
- **Vendor**: Lists the device manufacturer
- **Size**: List the storage capacity of the device.
- **LBA Mode**: Indicates whether the LBA (Logical Block Addressing) is a method of addressing data on a disk drive is supported or not.
- **Block Mode**: Block mode boosts IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per

interrupt if block mode is not used. Block mode allows transfers of up to 64 KB per interrupt.

- **PIO Mode**: Indicates the PIO mode of the installed device.
- **Async DMA**: Indicates the highest Asynchronous DMA Mode that is supported.
- **Ultra DMA**: Indicates the highest Synchronous DMA Mode that is supported.
- **S.M.A.R.T.**: Indicates whether or not the Self-Monitoring Analysis and Reporting Technology protocol is supported.
- **32Bit Data Transfer**: Enables 32-bit data transfer.

➔ **Type [Auto]**

Use the **Type** BIOS option select the type of device the AMIBIOS attempts to boot from after the Power-On Self-Test (POST) is complete.

➔ **Not Installed** BIOS is prevented from searching for an IDE disk drive on the specified channel.

➔ **Auto** **DEFAULT** The BIOS auto detects the IDE disk drive type attached to the specified channel. This setting should be used if an IDE hard disk drive is attached to the specified channel.

➔ **CD/DVD** The CD/DVD option specifies that an IDE CD-ROM drive is attached to the specified IDE channel. The BIOS does not attempt to search for other types of IDE disk drives on the specified channel.

➔ **ARMD** This option specifies an ATAPI Removable Media Device. These include, but are not limited to:

- ➔ **ZIP**
- ➔ **LS-120**

➔ **LBA/Large Mode [Auto]**

Use the **LBA/Large Mode** option to disable or enable BIOS to auto detects LBA (Logical Block Addressing). LBA is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB.

➔ **Disabled** BIOS is prevented from using the LBA mode control on the specified channel.

➔ **Auto** **DEFAULT** BIOS auto detects the LBA mode control on the specified channel.

➔ **Block (Multi Sector Transfer) [Auto]**

Use the **Block (Multi Sector Transfer)** to disable or enable BIOS to auto detect if the device supports multi-sector transfers.

➔ **Disabled** BIOS is prevented from using Multi-Sector Transfer on the specified channel. The data to and from the device occurs one sector at a time.

➔ **Auto** **DEFAULT** BIOS auto detects Multi-Sector Transfer support on the drive on the specified channel. If supported the data transfer to and from the device occurs multiple sectors at a time.

➔ **PIO Mode [Auto]**

Use the **PIO Mode** option to select the IDE PIO (Programmable I/O) mode program timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases.

➔ **Auto** **DEFAULT** BIOS auto detects the PIO mode. Use this value if the IDE disk drive support cannot be determined.

- ➔ **0** PIO mode 0 selected with a maximum transfer rate of 3.3MBps
- ➔ **1** PIO mode 1 selected with a maximum transfer rate of 5.2MBps
- ➔ **2** PIO mode 2 selected with a maximum transfer rate of 8.3MBps
- ➔ **3** PIO mode 3 selected with a maximum transfer rate of 11.1MBps
- ➔ **4** PIO mode 4 selected with a maximum transfer rate of 16.6MBps (This setting generally works with all hard disk drives manufactured after 1999. For other disk drives, such as IDE CD-ROM drives, check the specifications of the drive.)

➔ **DMA Mode [Auto]**

Use the **DMA Mode** BIOS selection to adjust the DMA mode options.

- ➔ **Auto** **DEFAULT** BIOS auto detects the DMA mode. Use this value if the IDE disk drive support cannot be determined.
- ➔ **SWDMA0** Single Word DMA mode 0 selected with a maximum data transfer rate of 2.1MBps
- ➔ **SWDMA1** Single Word DMA mode 1 selected with a maximum data transfer rate of 4.2MBps
- ➔ **SWDMA2** Single Word DMA mode 2 selected with a maximum data transfer rate of 8.3MBps
- ➔ **MWDMA0** Multi Word DMA mode 0 selected with a maximum data transfer rate of 4.2MBps
- ➔ **MWDMA1** Multi Word DMA mode 1 selected with a maximum data transfer rate of 13.3MBps
- ➔ **MWDMA2** Multi Word DMA mode 2 selected with a maximum data transfer rate of 16.6MBps

- **UDMA1** Ultra DMA mode 0 selected with a maximum data transfer rate of 16.6MBps
- **UDMA1** Ultra DMA mode 1 selected with a maximum data transfer rate of 25MBps
- **UDMA2** Ultra DMA mode 2 selected with a maximum data transfer rate of 33.3MBps
- **UDMA3** Ultra DMA mode 3 selected with a maximum data transfer rate of 44MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)
- **UDMA4** Ultra DMA mode 4 selected with a maximum data transfer rate of 66.6MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)
- **UDMA5** Ultra DMA mode 5 selected with a maximum data transfer rate of 99.9MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)

➔ **S.M.A.R.T [Auto]**

Use the **S.M.A.R.T** option to auto-detect, disable or enable Self-Monitoring Analysis and Reporting Technology (SMART) on the drive on the specified channel. **S.M.A.R.T** predicts impending drive failures. The **S.M.A.R.T** BIOS option enables or disables this function.

- **Auto** **DEFAULT** BIOS auto detects HDD SMART support.
- **Disabled** Prevents BIOS from using the HDD SMART feature.
- **Enabled** Allows BIOS to use the HDD SMART feature

➔ **32Bit Data Transfer [Enabled]**

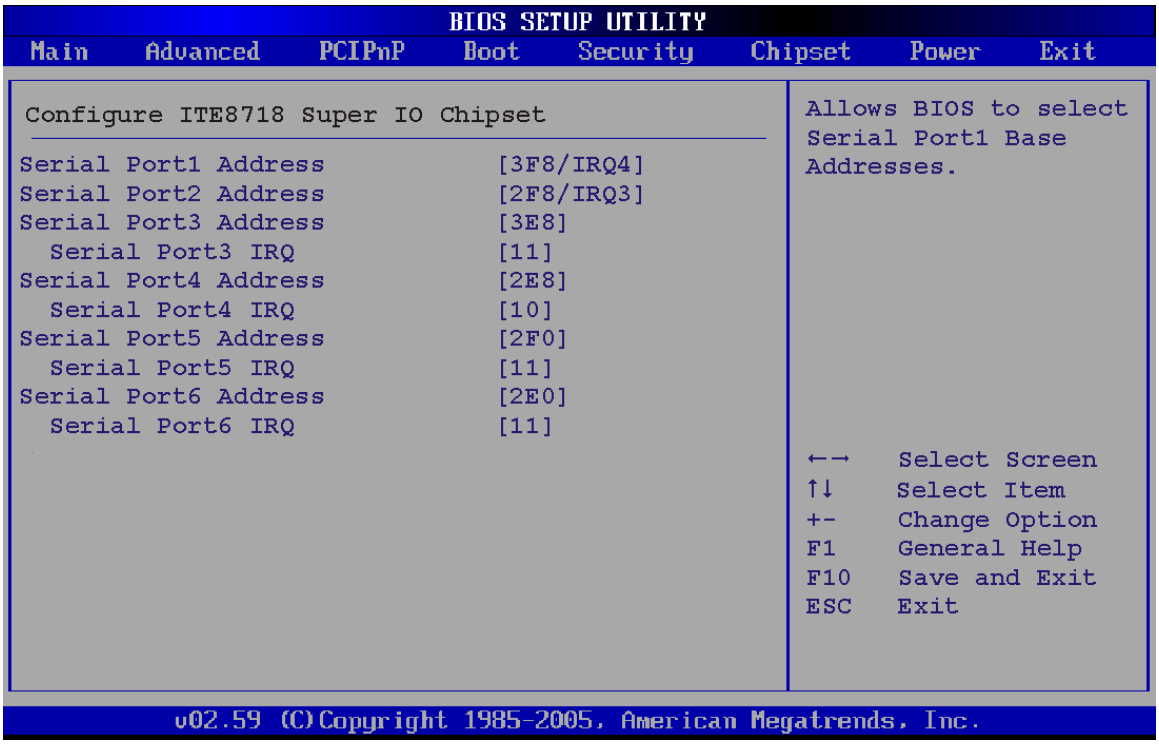
Use the **32Bit Data Transfer** BIOS option to enables or disable 32-bit data transfers.

➔ **Disabled** Prevents the BIOS from using 32-bit data transfers.

➔ **Enabled** **DEFAULT** Allows BIOS to use 32-bit data transfers on supported hard disk drives.

6.3.3 Super IO Configuration

Use the **Super IO Configuration** menu (**BIOS Menu 6**) to set or change the configurations for the FDD controllers, parallel ports and serial ports.



BIOS Menu 6: Super IO Configuration

➔ **Serial Port1 Address [3F8/IRQ4]**

Use the **Serial Port1 Address** option to select the Serial Port 1 base address.

➔ **Disabled** No base address is assigned to Serial Port 1

➔ **3F8/IRQ4** **DEFAULT** Serial Port 1 I/O port address is 3F8 and the interrupt

address is IRQ4

- **3E8/IRQ4** Serial Port 1 I/O port address is 3E8 and the interrupt address is IRQ4
- **2E8/IRQ3** Serial Port 1 I/O port address is 2E8 and the interrupt address is IRQ3

Serial Port2 Address [2F8/IRQ3]

Use the **Serial Port2 Address** option to select the Serial Port 2 base address.

- **Disabled** No base address is assigned to Serial Port 2
- **2F8/IRQ3** **DEFAULT** Serial Port 2 I/O port address is 3F8 and the interrupt address is IRQ3
- **3E8/IRQ4** Serial Port 2 I/O port address is 3E8 and the interrupt address is IRQ4
- **2E8/IRQ3** Serial Port 2 I/O port address is 2E8 and the interrupt address is IRQ3

Serial Port3 Address [3E8]

Use the **Serial Port3 Address** option to select the base addresses for serial port 3

- **Disabled** No base address is assigned to serial port 3
- **3E8** **DEFAULT** Serial port 3 I/O port address is 3E8
- **2E8** Serial port 3 I/O port address is 2E8
- **2F0** Serial port 3 I/O port address is 2F0
- **2E0** Serial port 3 I/O port address is 2E0

Serial Port3 IRQ [11]

Use the **Serial Port3 IRQ** option to select the interrupt address for serial port 3.

- ➔ **10** Serial port 3 IRQ address is 10
- ➔ **11** **DEFAULT** Serial port 3 IRQ address is 11

➔ **Serial Port4 Address [2E8]**

Use the **Serial Port4 IRQ** option to select the interrupt address for serial port 4.

- ➔ **Disabled** No base address is assigned to serial port 3
- ➔ **3E8** Serial port 4 I/O port address is 3E8
- ➔ **2E8** **DEFAULT** Serial port 4 I/O port address is 2E8
- ➔ **2F0** Serial port 4 I/O port address is 2F0
- ➔ **2E0** Serial port 4 I/O port address is 2E0

➔ **Serial Port4 IRQ [10]**

Use the **Serial Port4 IRQ** option to select the interrupt address for serial port 4.

- ➔ **10** **DEFAULT** Serial port 4 IRQ address is 10
- ➔ **11** Serial port 4 IRQ address is 11

➔ **Serial Port5 Address [2F0]**

Use the **Serial Port5 Address** option to select the base addresses for serial port 5

- ➔ **Disabled** No base address is assigned to serial port 5
- ➔ **3E8** Serial port 5 I/O port address is 2F0
- ➔ **2E8** Serial port 5 I/O port address is 2E8

- ➔ **2F0** **DEFAULT** Serial port 5 I/O port address is 2F0
- ➔ **2E0** Serial port 5 I/O port address is 2E0

➔ **Serial Port5 IRQ [11]**

Use the **Serial Port3 IRQ** option to select the interrupt address for serial port 5.

- ➔ **10** Serial port 5 IRQ address is 10
- ➔ **11** **DEFAULT** Serial port 5 IRQ address is 11

➔ **Serial Port6 Address [2E0]**

Use the **Serial Port4 IRQ** option to select the interrupt address for serial port 6.

- ➔ **Disabled** No base address is assigned to serial port 6
- ➔ **3E8** Serial port 6 I/O port address is 3E8
- ➔ **2E8** Serial port 6 I/O port address is 2E8
- ➔ **2F0** Serial port 6 I/O port address is 2F0
- ➔ **2E0** **DEFAULT** Serial port 6 I/O port address is 2E0

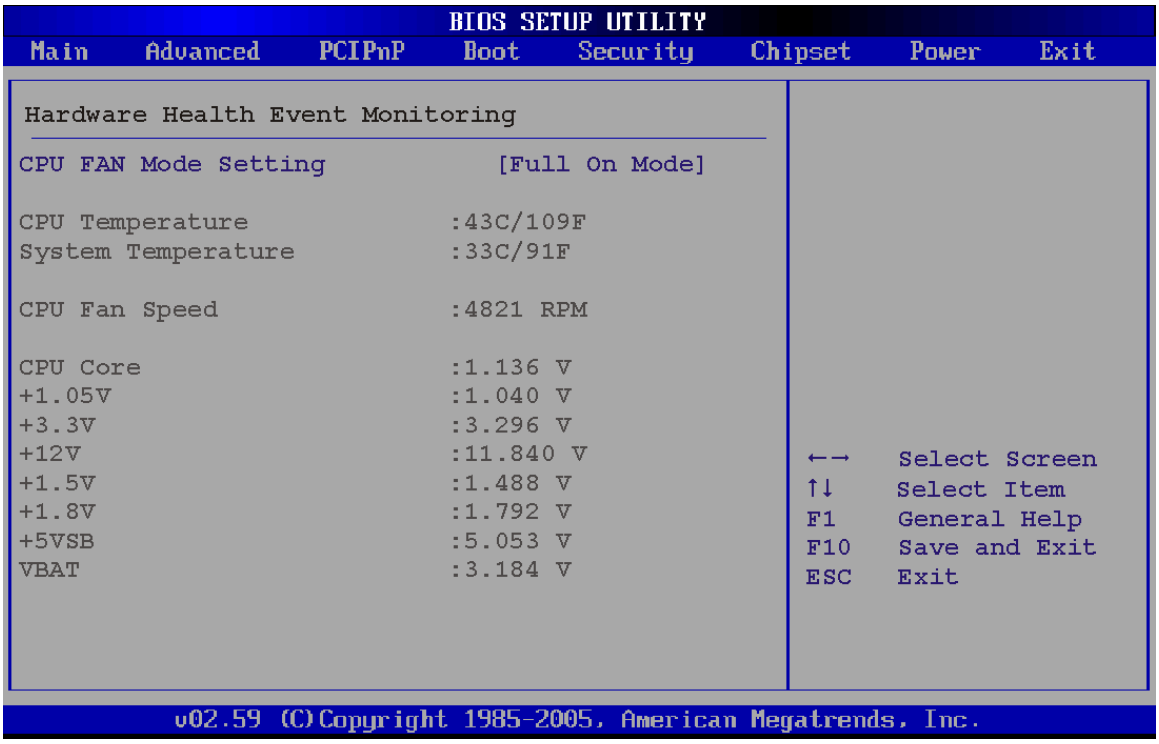
➔ **Serial Port6 IRQ [10]**

Use the **Serial Port6 IRQ** option to select the interrupt address for serial port 6.

- ➔ **10** Serial port 6 IRQ address is 10
- ➔ **11** **DEFAULT** Serial port 6 IRQ address is 11

6.3.4 Hardware Health Configuration

The **Hardware Health Configuration** menu (**BIOS Menu 7**) shows the operating temperature, fan speeds and system voltages.



BIOS Menu 7: Hardware Health Configuration

➔ **CPU FAN Mode Setting [Full On Mode]**

Use the **CPU FAN Mode Setting** option to configure the second fan.

➔ **Full On Mode**	**DEFAULT**	Fan is on all the time
➔ **Automatic mode**		Fan is off when the temperature is low enough. Parameters must be set by the user.
➔ **PWM Manual mode**		Pulse width modulation set manually

When the **CPU FAN Mode Setting** option is in the **Automatic Mode**, the following parameters can be set.

- CPU Temp. Limit of OFF
- CPU Temp. Limit of Start

- CPU Fan Start PWM
- Slope PWM 1

When the **CPU FAN Mode Setting** option is in the **PWM Manual Mode**, the following parameters can be set.

- CPU Fan PWM control

➔ **CPU Temp. Limit of OFF [000]**

WARNING:

Setting this value too high may cause the fan to stop when the CPU is at a high temperature and therefore cause the system to be damaged.

The **CPU Temp. Limit of OFF** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Temp. Limit of OFF** option to select the CPU temperature at which the cooling fan should automatically turn off. To select a value, select the **CPU Temp. Limit of OFF** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- Minimum Value: 0°C
- Maximum Value: 127°C

➔ **CPU Temp. Limit of Start [020]**

WARNING:

Setting this value too high may cause the fan to start only when the CPU is at a high temperature and therefore cause the system to be damaged.

The **CPU Temp. Limit of Start** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Temp. Limit of Start** option to select the CPU temperature at which the cooling fan should automatically turn on. When the fan starts, it rotates using the starting pulse width modulation (PWM) specified in the **Fan 3 Start PWM** option below. To select a value, select the **CPU Temp. Limit of Start** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- Minimum Value: 0°C
- Maximum Value: 127°C

➔ **CPU Fan Start PWM [070]**

The **Fan 3 Start PWM** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **Fan 3 Start PWM** option to select the PWM mode the fan starts to rotate with after the temperature specified in the **Temperature 3 Limit of Start** is exceeded. The Super I/O chipset supports 128 PWM modes. To select a value, select the **Fan 3 Start PWM** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- PWM Minimum Mode: 0
- PWM Maximum Mode: 127

➔ **Slope PWM [0.5 PWM]**

The **Slope PWM 1** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **Slope PWM 1** option to select the linear rate at which the PWM mode increases with respect to an increase in temperature. A list of available options is shown below:

- 0 PWM
- 1 PWM
- 2 PWM
- 4 PWM
- 8 PWM

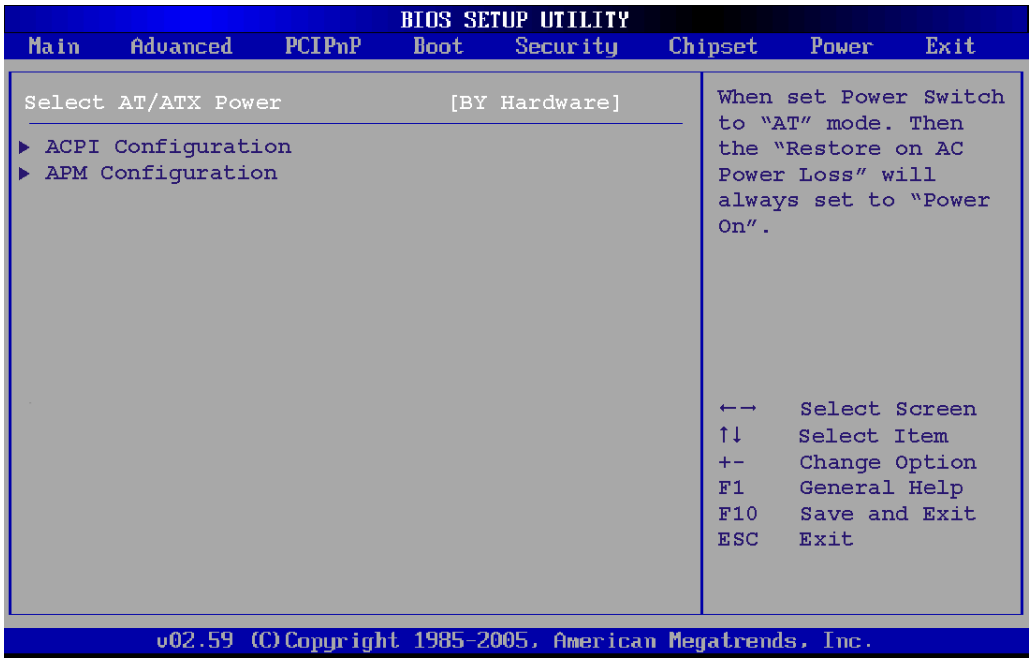
- 16 PWM
- 32 PWM
- 64 PWM

The following system parameters and values are shown. The system parameters that are monitored are:

- **System Temperatures**: The following system temperatures are monitored
  - CPU Temperature
  - System Temperature
- **Fan Speeds**: The CPU cooling fan speed is monitored.
  - CPU Fan Speed
- **Voltages**: The following system voltages are monitored
  - CPU Core
  - +1.05V
  - +3.30V
  - +12.0 V
  - +1.5V
  - +1.8V
  - 5VSB
  - VBAT

6.3.5 Power Configuration

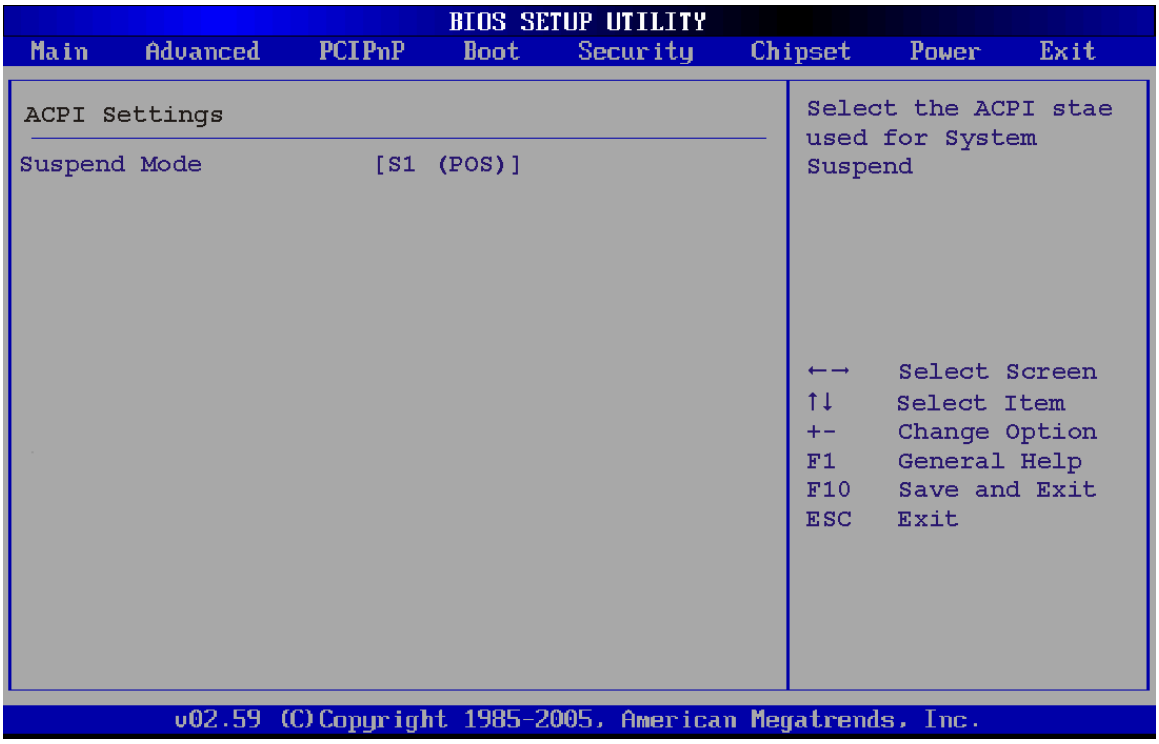
The **Power Configuration** menu (BIOS Menu 8) configures the Advanced Configuration and Power Interface (ACPI) and Power Management (APM) options.



BIOS Menu 8: Power Configuration

6.3.5.1 ACPI configuration

The **ACPI Configuration** menu (**BIOS Menu 9**) configures the Advanced Configuration and Power Interface (ACPI).



BIOS Menu 9: ACPI Configuration

➔ **Suspend Mode [S1(POS)]**

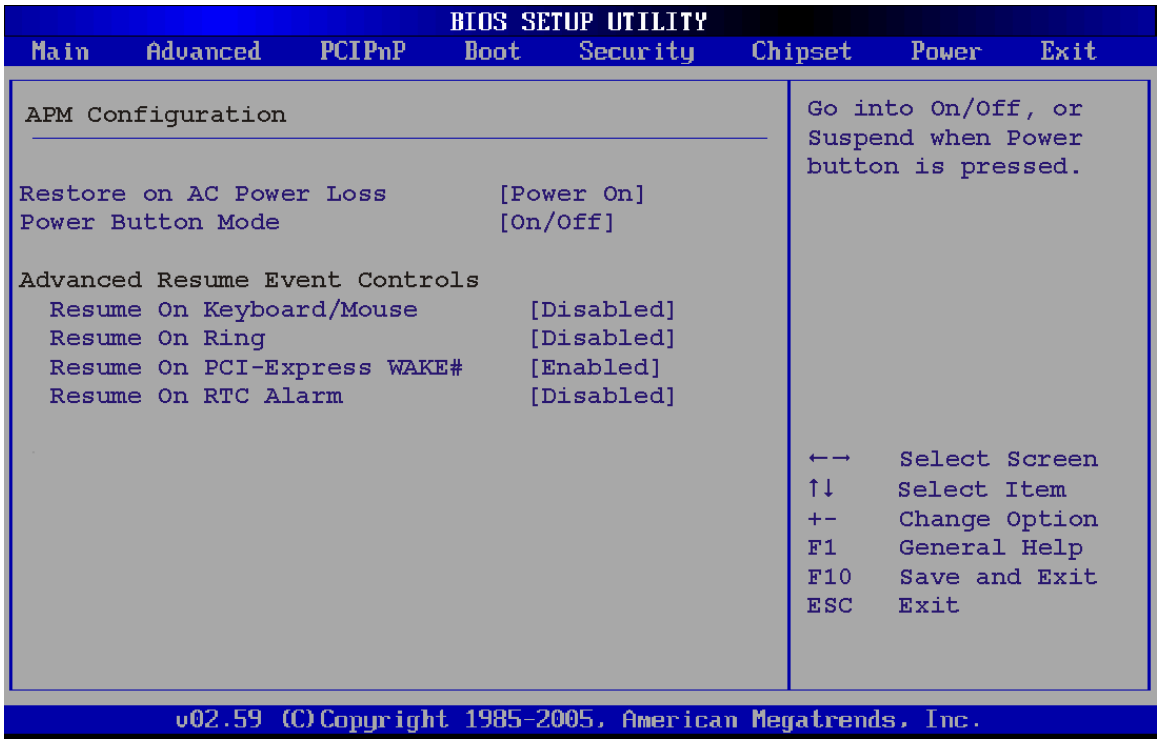
Use the **Suspend Mode** BIOS option to specify the sleep state the system enters when it is not being used.

➔ **S1 (POS)** **DEFAULT** System appears off. The CPU is stopped; RAM is refreshed; the system is running in a low power mode.

➔ **S3 (STR)** System appears off. The CPU has no power; RAM is in slow refresh; the power supply is in a reduced power mode.

6.3.5.2 APM Configuration

The **APM Configuration** menu (**BIOS Menu 10**) allows the advanced power management options to be configured.



BIOS Menu 10:Advanced Power Management Configuration

➔ **Restore on AC Power Loss [Last State]**

Use the **Restore on AC Power Loss** BIOS option to specify what state the system returns to if there is a sudden loss of power to the system.

➔ **Power Off** The system remains turned off

➔ **Power On** The system turns on

➔ **Last State** **DEFAULT** The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off.

➔ **Power Button Mode [On/Off]**

Use the **Power Button Mode** BIOS to specify how the power button functions.

➔ **On/Off** **DEFAULT** When the power button is pressed the system is either

turned on or off

➔ **Suspend** When the power button is pressed the system goes into suspend mode

➔ **Resume on Keyboard/Mouse [Disabled]**

Use the **Resume on Keyboard/Mouse** BIOS option to enable activity on either the keyboard or mouse to rouse the system from a suspend or standby state. That is, the system is roused when the mouse is moved or a button on the keyboard is pressed.

➔ **Disabled** (Default) Wake event not generated by activity on the keyboard or mouse

➔ **Enabled** Wake event generated by activity on the keyboard or mouse

➔ **Resume on Ring [Disabled]**

Use the **Resume on Ring** BIOS option to enable activity on the RI (ring in) modem line to rouse the system from a suspend or standby state. That is, the system will be roused by an incoming call on a modem.

➔ **Disabled** **DEFAULT** Wake event not generated by an incoming call

➔ **Enabled** Wake event generated by an incoming call

➔ **Resume on PCI-Express WAKE# [Enabled]**

Use the **Resume PCI-Express WAKE#** BIOS option to enable activity on the PCI-Express WAKE# signal to rouse the system from a suspend or standby state.

➔ **Disabled** Wake event not generated by PCI-Express WAKE# signal activity

➔ **Enabled** **DEFAULT** Wake event generated by PCI-Express WAKE# signal

activity

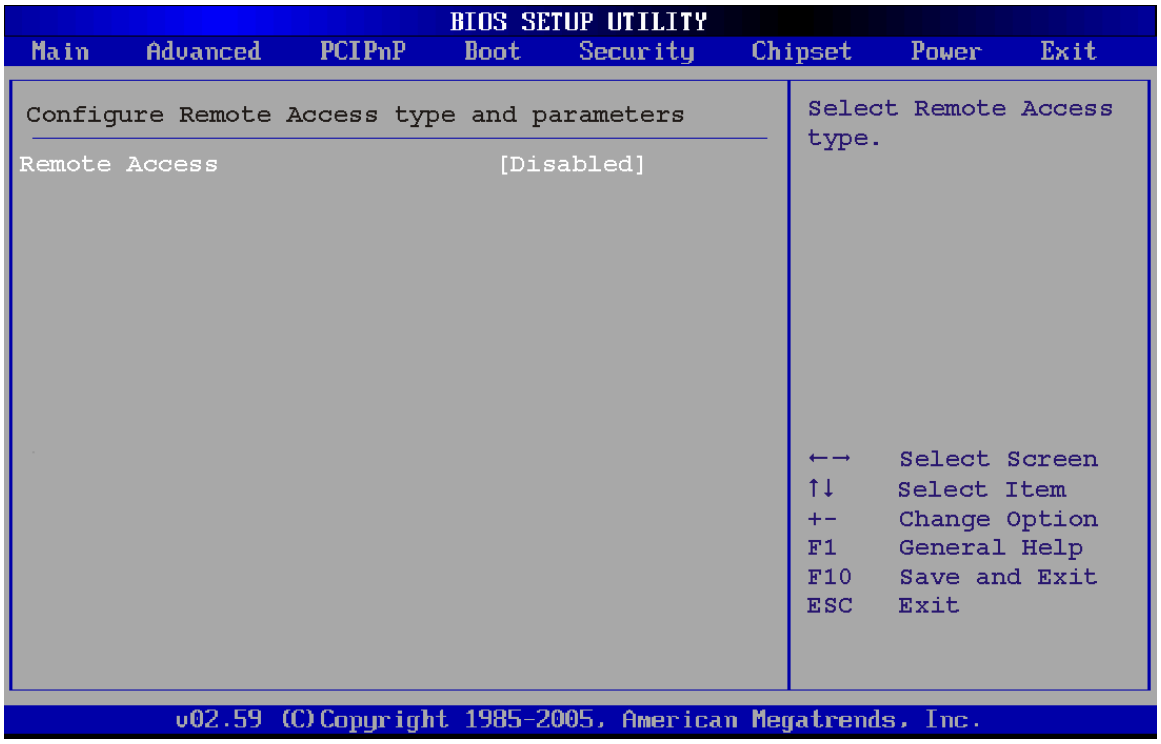
➔ **Resume On RTC Alarm [Disabled]**

Use the **Resume On RTC Alarm** option to specify the time the system should be roused from a suspended state.

➔ **Disabled**	**DEFAULT**	The real time clock (RTC) cannot generate a wake event
➔ **Enabled**		If selected, the following appears with values that can be selected: ➔ **RTC Alarm Date (Days)** ➔ **System Time** After setting the alarm, the computer turns itself on from a suspend state when the alarm goes off.

6.3.6 Remote Configuration

Use the **Remote Access Configuration** menu (**BIOS Menu 11**) to configure remote access parameters. The **Remote Access Configuration** is an AMIBIOS feature and allows a remote host running a terminal program to display and configure the BIOS settings.



BIOS Menu 11: Remote Access Configuration [Advanced]

➔ **Remote Access [Disabled]**

Use the **Remote Access** option to enable or disable access to the remote functionalities of the system.

➔ **Disabled** **DEFAULT** Remote access is disabled.

➔ **Enabled** Remote access configuration options shown below appear:

- ➔ **Serial Port Number**
- ➔ **Serial Port Mode**
- ➔ **Flow Control**
- ➔ **Redirection after BIOS POST**

➔ **Terminal Type**

➔ **VT-UTF8 Combo Key Support**

These configuration options are discussed below.

➔ **Serial Port Number [COM1]**

Use the **Serial Port Number** option allows to select the serial port used for remote access.

➔ **COM1** **DEFAULT** System is remotely accessed through COM1

➔ **COM2** System is remotely accessed through COM2

NOTE: Make sure the selected COM port is enabled through the Super I/O configuration menu.

➔ **Base Address, IRQ [2F8h,3]**

The **Base Address, IRQ** option cannot be configured and only shows the interrupt address of the serial port listed above.

➔ **Serial Port Mode [115200 8,n,1]**

Use the **Serial Port Mode** option to select baud rate through which the console redirection is made. The following configuration options are available

- 115200 8,n,1 DEFAULT
- 57600 8,n,1
- 38400 8,n,1
- 19200 8,n,1
- 09600 8,n,1

NOTE:

Identical baud rate setting musts be set on the host (a management computer running a terminal software) and the slave

➔ **Flow Control [None]**

Use the **Flow Control** option to report the flow control method for the console redirection application.

➔ **None**	**DEFAULT**	No control flow,
➔ **Hardware**		Hardware is set as the console redirection
➔ **Software**		Software is set as the console redirection

➔ **Redirection After BIOS POST [Always]**

Use the **Redirection After BIOS POST** option to specify when console redirection should occur.

➔ **Disabled**		The console is not redirected after POST
➔ **Boot Loader**		Redirection is active during POST and during Boot Loader
➔ **Always**	**DEFAULT**	Redirection is always active (Some OSes may not work if set to Always)

➔ **Terminal Type [ANSI]**

Use the **Terminal Type** BIOS option to specify the remote terminal type.

➔ **ANSI**	**DEFAULT**	The target terminal type is ANSI
➔ **VT100**		The target terminal type is VT100
➔ **VT-UTF8**		The target terminal type is VT-UTF8

➔ **VT-UTF8 Combo Key Support [Disabled]**

Use the **VT-UFT8 Combo Key Support** option to enable additional keys that are not provided by VT100 for the PC 101 keyboard.

The VT100 Terminal Definition is the standard convention used to configure and conduct emergency management tasks with UNIX-based servers. VT100 does not support all keys on the standard PC 101-key layout, however. The VT-UTF8 convention makes available additional keys that are not provided by VT100 for the PC 101 keyboard.

➔ **Disabled** **DEFAULT** Disables the VT-UTF8 terminal keys

➔ **Enabled** Enables the VT-UTF8 combination key. Support for ANSI/VT100 terminals

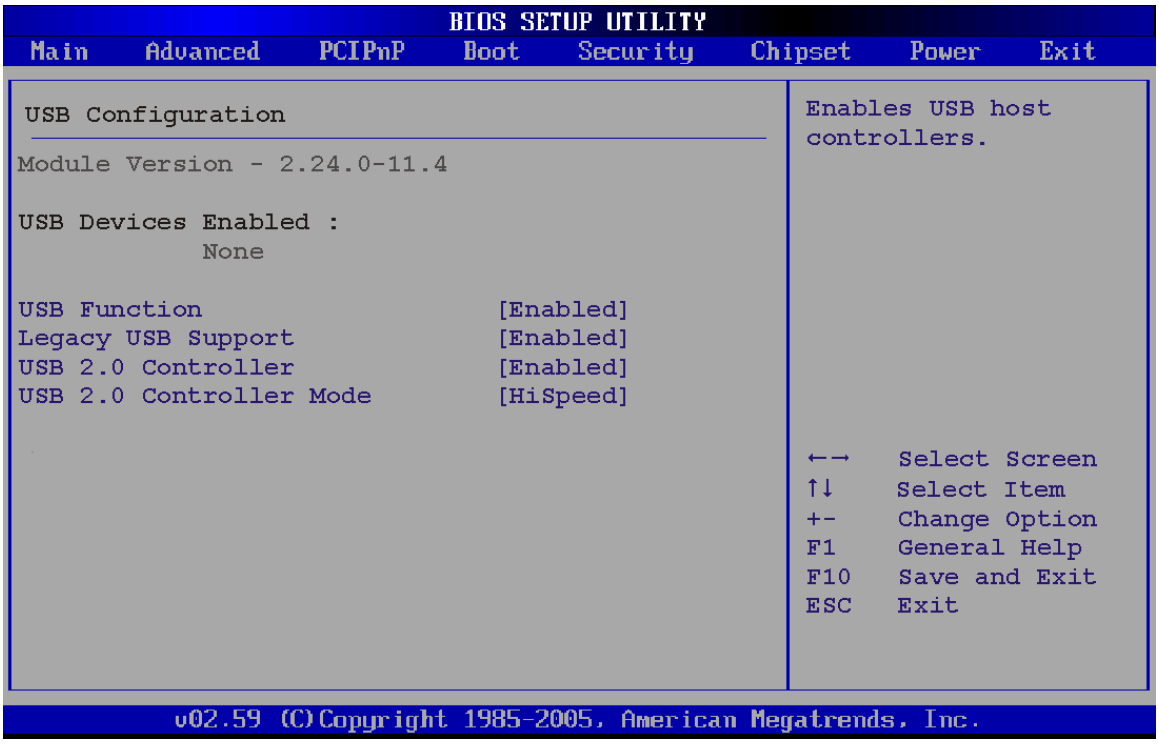
➔ **Sredir Memory Display Delay [Disabled]**

Use the **Sredir Memory Display Delay** option to select the delay before memory information is displayed. Configuration options are listed below

- No Delay DEFAULT
- Delay 1 sec
- Delay 2 sec
- Delay 4 sec

6.3.7 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 12**) to read USB configuration information and configure the USB settings.



BIOS Menu 12: USB Configuration

➔ **USB Functions [Enabled]**

Use the **USB Function** option to enable or disable the USB controllers.

➔ **Disabled** USB controllers are enabled

➔ **Enabled** **DEFAULT** USB controllers are disabled

➔ **USB 2.0 Controller [Enabled]**

The **USB 2.0 Controller** BIOS option enables or disables the USB 2.0 controller

➔ **Disabled** USB function disabled

➔ **Enabled** **DEFAULT** USB function enabled

➔ **USB2.0 Controller Mode [HiSpeed]**

The **USB2.0 Controller Mode** BIOS option sets the speed of the USB2.0 controller.

➔ **FullSpeed**		The controller is capable of operating at full speed 12 Mb/s
➔ **HiSpeed**	**DEFAULT**	The controller is capable of operating at high speed 480 Mb/s

➔ **Legacy USB Support [Enabled]**

Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support.

Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded onto the system.

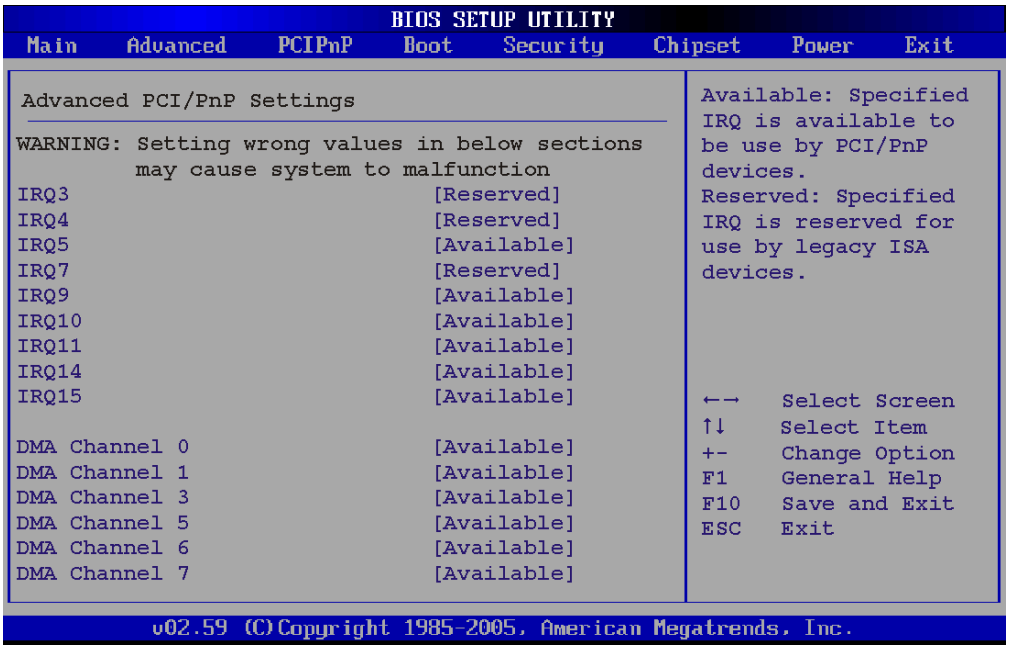
➔ **Disabled**		Legacy USB support disabled
➔ **Enabled**	**DEFAULT**	Legacy USB support enabled
➔ **Auto**		Legacy USB support disabled if no USB devices are connected

6.4 PCI/PnP

Use the PCI/PnP menu (BIOS Menu 13) to configure advanced PCI and PnP settings.

WARNING:

Setting wrong values for the BIOS selections in the PCIPnP BIOS menu may cause the system to malfunction.



BIOS Menu 13: PCI/PnP Configuration

➔ **IRQ# [Available]**

Use the **IRQ#** address to specify what IRQs can be assigned to a particular peripheral device.

➔ **Available** **DEFAULT** The specified IRQ is available to be used by PCI/PnP devices

➔ **Reserved** The specified IRQ is reserved for use by Legacy ISA devices

Available IRQ addresses are:

- IRQ3
- IRQ4
- IRQ5
- IRQ7

- IRQ9
- IRQ10
- IRQ 11
- IRQ 14
- IRQ 15

➔ **DMA Channel# [Available]**

Use the **DMA Channel#** option to assign a specific DMA channel to a particular PCI/PnP device.

➔ **Available**	**DEFAULT**	The specified DMA is available to be used by PCI/PnP devices
➔ **Reserved**		The specified DMA is reserved for use by Legacy ISA devices

Available DMA Channels are:

- DM Channel 0
- DM Channel 1
- DM Channel 3
- DM Channel 5
- DM Channel 6
- DM Channel 7

➔ **Reserved Memory Size [Disabled]**

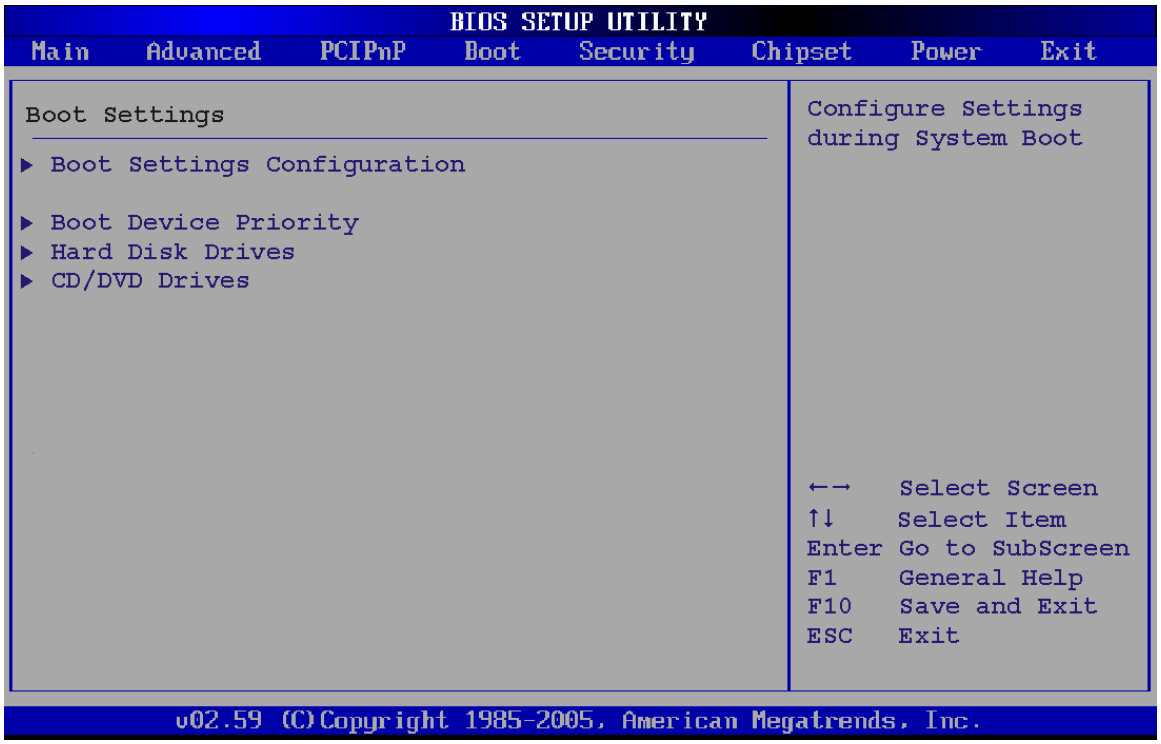
Use the **Reserved Memory Size** BIOS option to specify the amount of memory that should be reserved for legacy ISA devices.

➔ **Disabled**	**DEFAULT**	No memory block reserved for legacy ISA devices
➔ **16K**		16KB reserved for legacy ISA devices
➔ **32K**		32KB reserved for legacy ISA devices

➔ **64K** 54KB reserved for legacy ISA devices

6.5 Boot

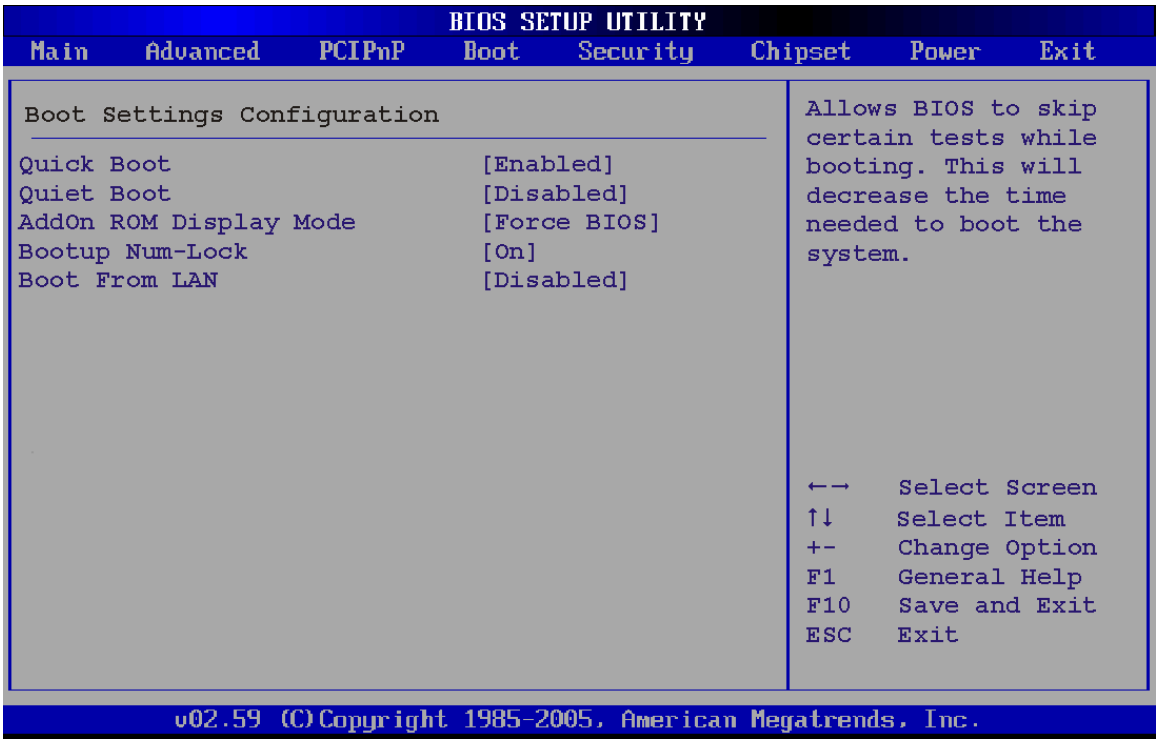
Use the Boot menu (BIOS Menu 14) to configure system boot options.



BIOS Menu 14: Boot

6.5.1 Boot Settings Configuration

Use the Boot Settings Configuration menu (BIOS Menu 14) to configure advanced system boot options.



BIOS Menu 15: Boot Settings Configuration

➔ **Quick Boot [Enabled]**

Use the **Quick Boot** BIOS option to make the computer speed up the boot process.

➔ **Disabled**		No POST procedures are skipped
➔ **Enabled**	**DEFAULT**	Some POST procedures are skipped to decrease the system boot time

➔ **Quiet Boot [Disabled]**

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

➔ **Disabled**	**DEFAULT**	Normal POST messages displayed
➔ **Enabled**		OEM Logo displayed instead of POST messages

➔ **AddOn ROM Display Mode [Force BIOS]**

The **AddOn ROM Display Mode** option allows add-on ROM (read-only memory) messages to be displayed.

➔ **Force BIOS**	**DEFAULT**	Allows the computer system to force a third party BIOS to display during system boot.
➔ **Keep Current**		Allows the computer system to display the information during system boot.

➔ **Bootup Num-Lock [Off]**

The **Bootup Num-Lock** BIOS option allows the Number Lock setting to be modified during boot up.

➔ **Off**	**DEFAULT**	Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.
➔ **On**		Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

➔ **Boot From LAN Support [Disabled]**

The **BOOT From LAN Support** option enables the system to be booted from a remote system.

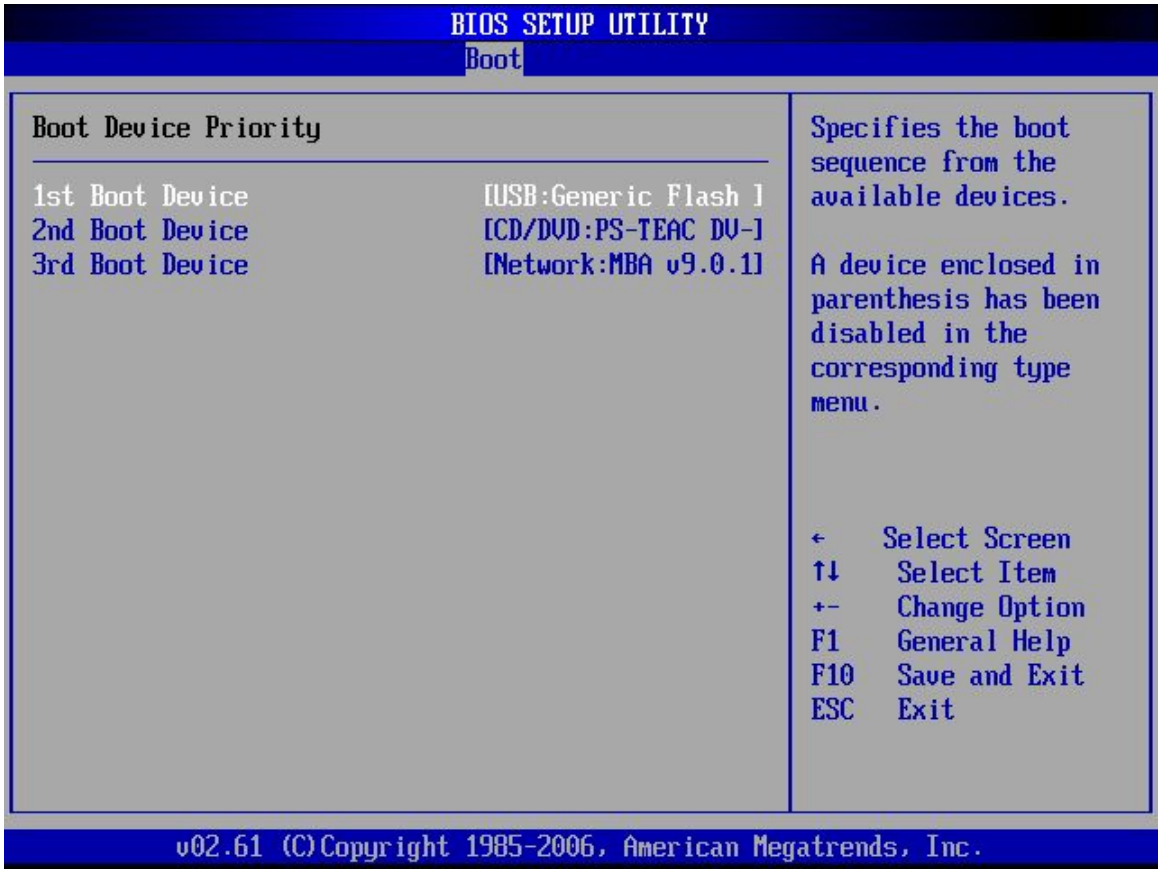
➔ **Disabled**	**DEFAULT**	Cannot be booted from a remote system through the LAN

➔ **Enabled** **DEFAULT** Can be booted from a remote system through the LAN

6.5.2 Boot Device Priority

Use the **Boot Device Priority** menu (**BIOS Menu 16**) to specify the boot sequence from the available devices. The following options are available:

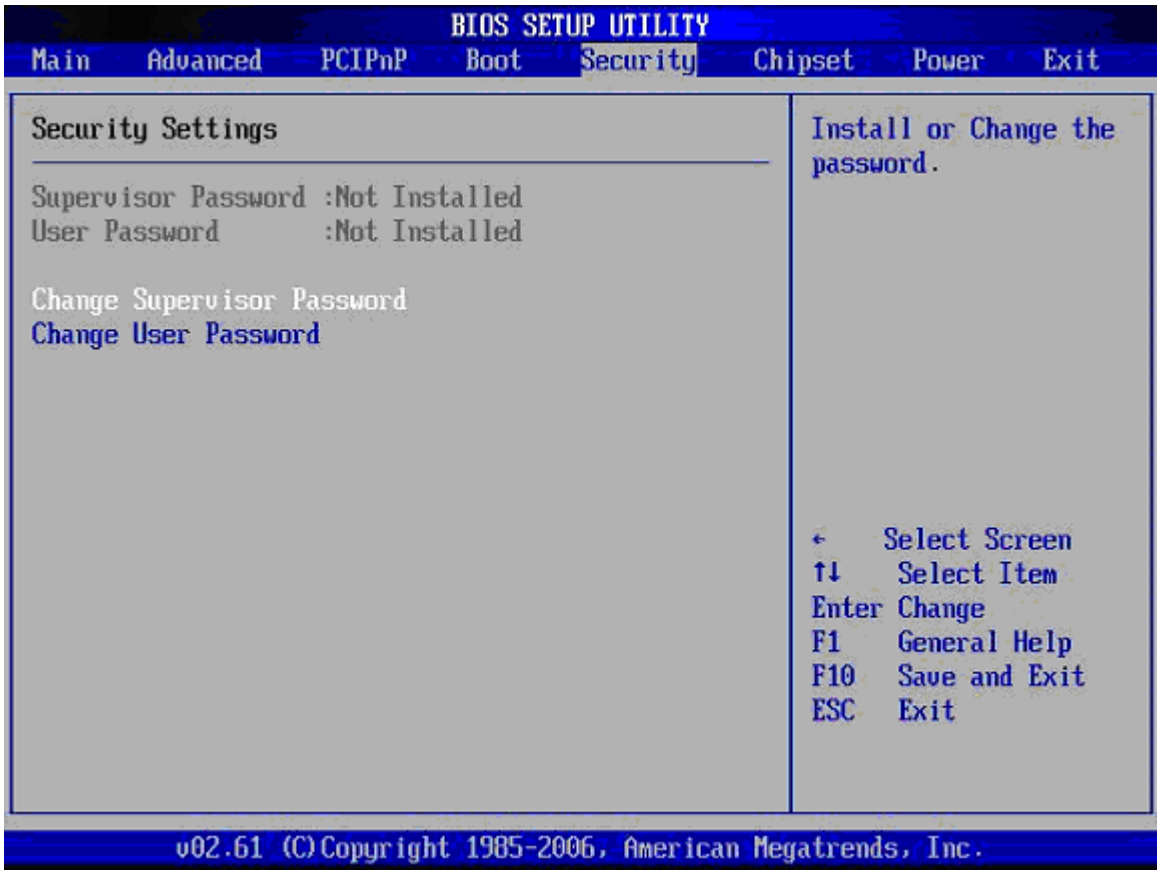
- 1st Boot Device
- 2nd Boot Device
- 3rd Boot Device



BIOS Menu 16: Boot Device Priority Settings

6.6 Security

Use the Security menu (BIOS Menu 17) to set system and user passwords.



BIOS Menu 17: Security

➔ **Change Supervisor Password**

Use the **Change Supervisor Password** to set or change a supervisor password. The default for this option is **Not Installed**. If a supervisor password must be installed, select this field and enter the password. After the password has been added, **Install** appears next to **Change Supervisor Password**.

➔ **Change User Password**

Use the **Change User Password** to set or change a user password. The default for this option is **Not Installed**. If a user password must be installed, select this field and enter the

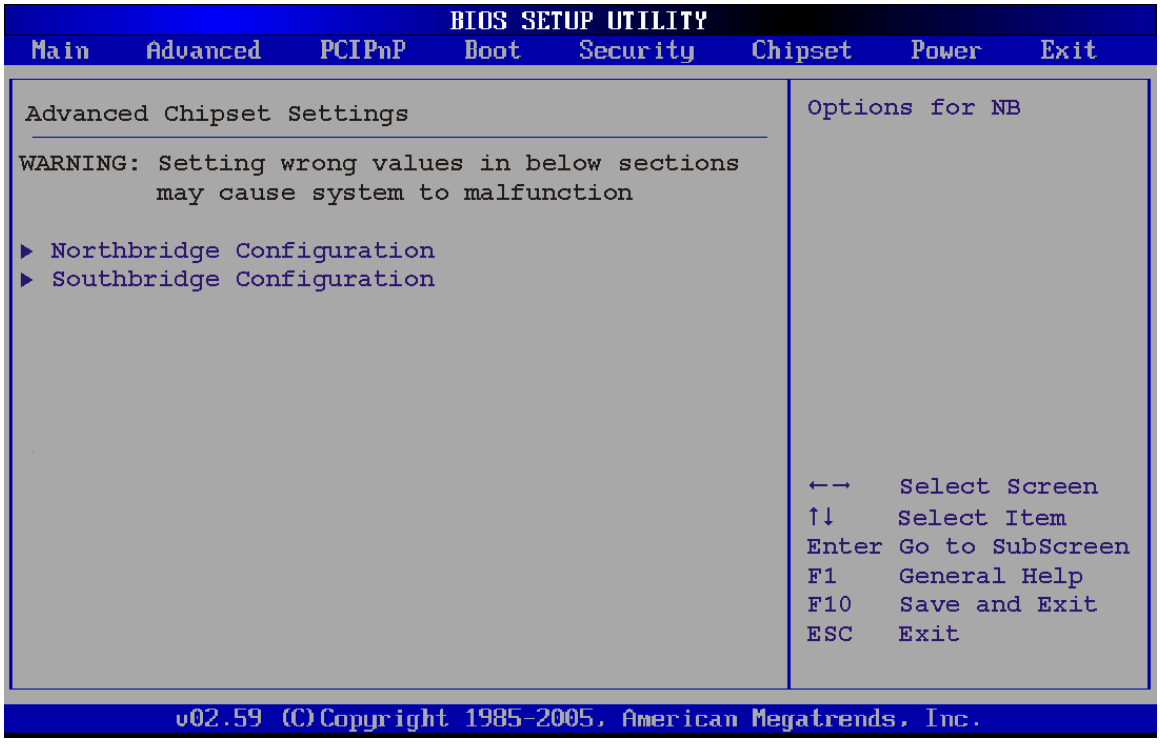
password. After the password has been added, **Install** appears next to **Change User Password**.

6.7 Chipset

Use the **Chipset** menu (**BIOS Menu 18**) to access the NorthBridge and SouthBridge configuration menus

WARNING!

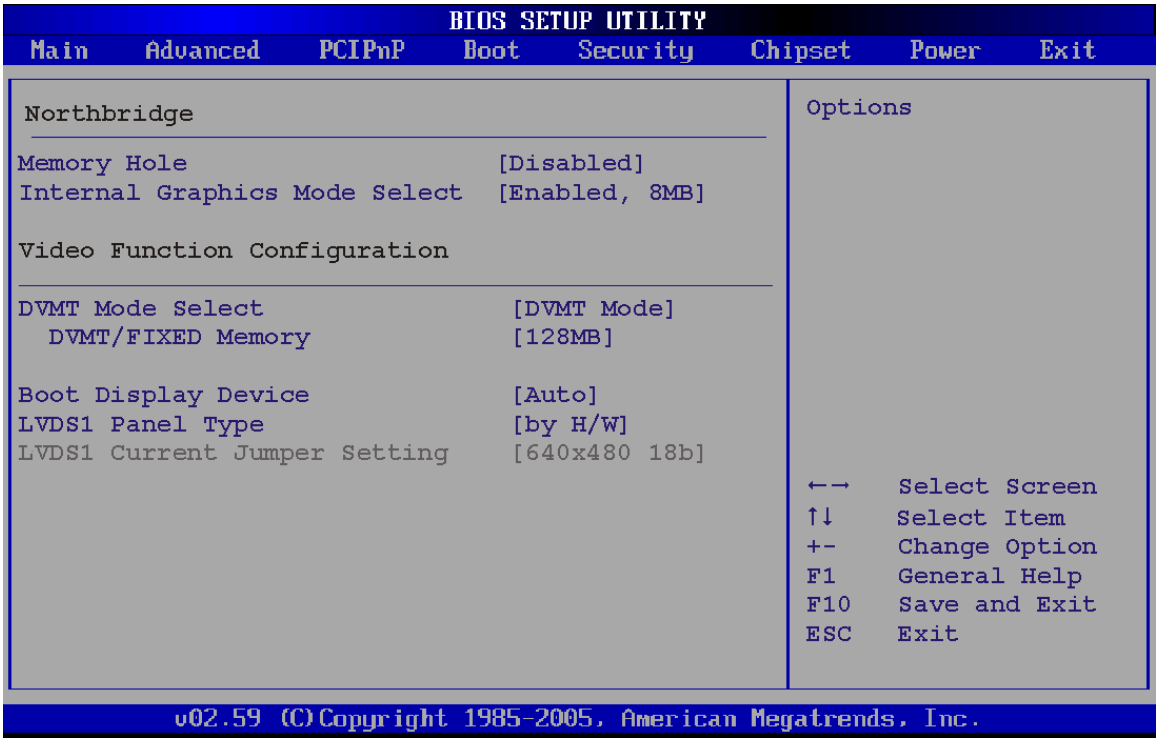
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.



BIOS Menu 18: Chipset

6.7.1 North Bridge Chipset Configuration

Use the **North Bridge Chipset Configuration** menu (BIOS Menu 18) to configure the Northbridge chipset settings.



BIOS Menu 19:North Bridge Chipset Configuration

➔ **Memory Hole [Disabled]**

The **Memory Hole** reserves the memory space between 15MB and 16MB for ISA expansion cards that require a specified area of memory to work properly. If an older ISA expansion card is used, please refer to the documentation that came with the card to see if it is necessary to reserve the space.

➔ **Disabled** **DEFAULT** Memory is not reserved for ISA expansion cards

➔ **Enabled** Memory is reserved for ISA expansion cards

➔ **Internal Graphics Mode Select [Enable, 8MB]**

The **Internal Graphic Mode Select** option determines the amount of system memory that can be used by the Internal graphics device.

➔ **Disable**		
➔ **Enable, 1MB**		1MB of memory used by internal graphics device
➔ **Enable, 8MB**	**DEFAULT**	8MB of memory used by internal graphics device

➔ **DVMT Mode Select [DVMT Mode]**

Use the **DVMT Mode Select** option to select the Intel Dynamic Video Memory Technology (DVMT) operating mode.

➔ **Fixed Mode**		A fixed portion of graphics memory is reserved as graphics memory.
➔ **DVMT Mode**	**DEFAULT**	Graphics memory is dynamically allocated according to the system and graphics needs.
➔ **Combo Mode**		A fixed portion of graphics memory is reserved as graphics memory. If more memory is needed, graphics memory is dynamically allocated according to the system and graphics needs.

➔ **DVMT/FIXED Memory**

Use the **DVMT/FIXED Memory** option to specify the maximum amount of memory that can be allocated as graphics memory. This option can only be configured for if **DVMT Mode** or **Fixed Mode** is selected in the **DVMT Mode Selec**t option. If **Combo Mode** is selected, the maximum amount of graphics memory is 128MB. Configuration options are listed below.

- 64MB
- 128MB **DEFAULT**

- Maximum DVMT

➔ **Boot Display Device [Auto]**

The **Boot Display Device** BIOS option selects the display device the system uses when it boots. The available options are listed below:

- Auto **DEFAULT**
- CRT
- LFP

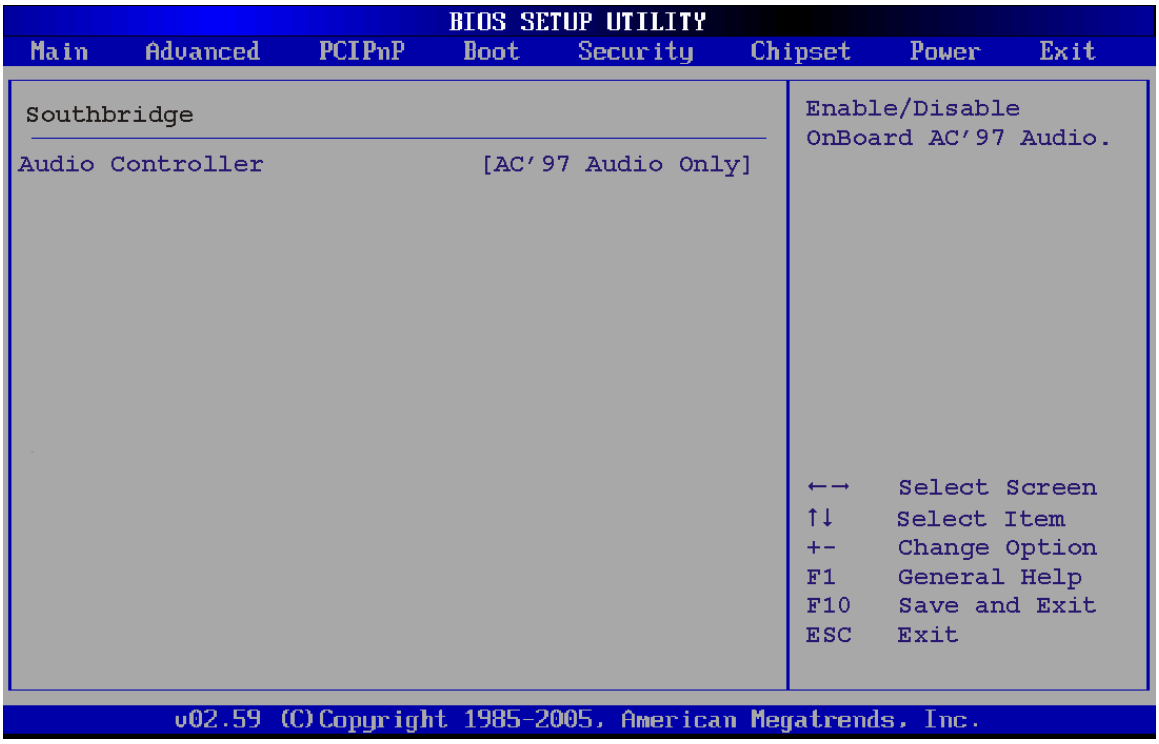
➔ **LVDS1 Panel Type**

Use the **LVDS Panel Type** to determine the LCD panel resolution. Configuration options are listed below:

- 640 x 480 18b
- 800 x 480 18b
- 800 x 600 18b
- 1024 x 768 18b
- 1280 x 1024 36b
- 1400 x 1050 36b
- 1440 x 900 36b
- 1600 x 1200 36b
- by H/W

6.7.2 SouthBridge Configuration

The **SouthBridge Configuration** menu (BIOS Menu 20) the southbridge chipset to be configured.



BIOS Menu 20:SouthBridge Chipset Configuration

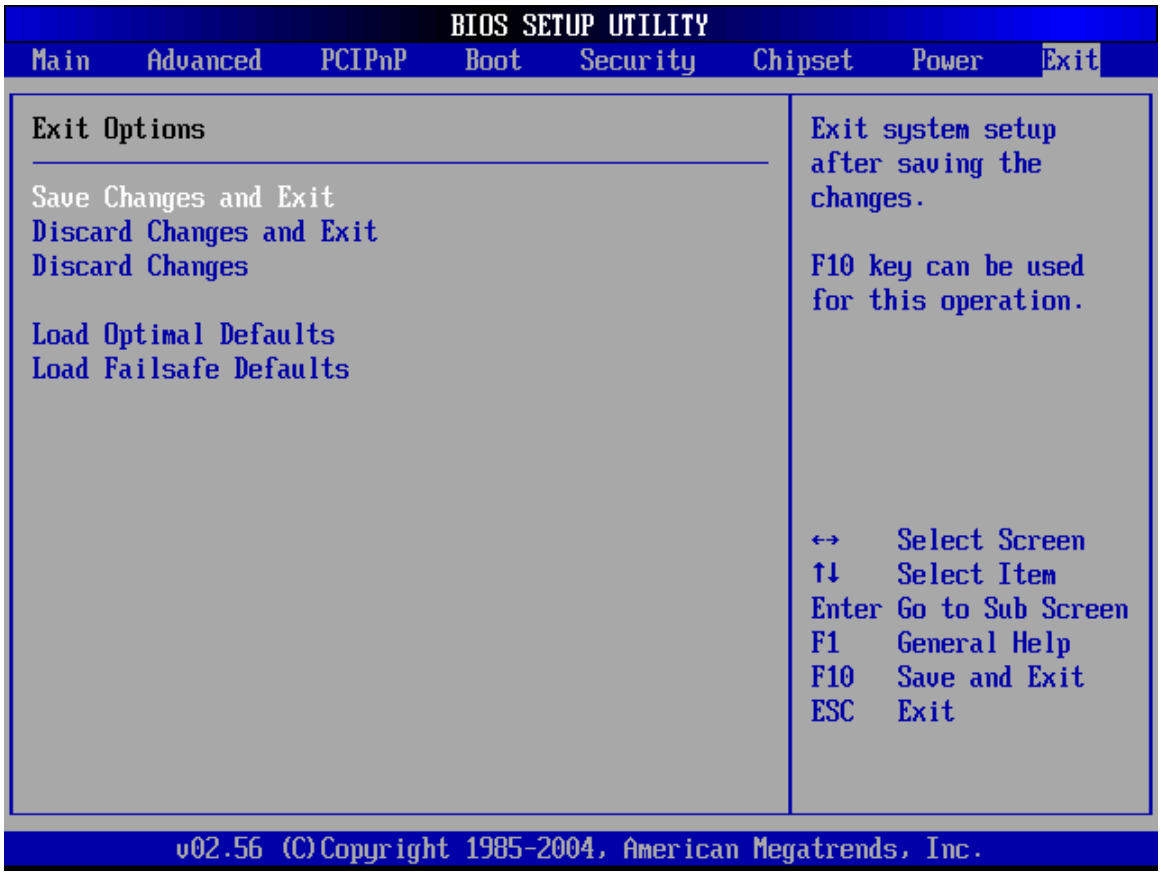
➔ **Audio Controller [All Disabled]**

The **Audio Controller** option enables or disables the audio controller.

➔	**AC’97 Audio Only**		The on-board AC’97 audio controller is enabled.
➔	**All Disabled**	**DEFAULT**	The on-board audio controller is disabled.

6.8 Exit

Use the **Exit** menu (**BIOS Menu 21**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 21:Exit

➔ **Save Changes and Exit**

Use the **Save Changes and Exit** option to save the changes made to the BIOS options and to exit the BIOS configuration setup program.

➔ **Discard Changes and Exit**

Use the **Discard Changes and Exit** option to exit the BIOS configuration setup program without saving the changes made to the system.

➔ **Discard Changes**

Use the **Discard Changes** option to discard the changes and remain in the BIOS configuration setup program.

➔ **Load Optimal Defaults**

Use the **Load Optimal Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F9 key can be used for this operation.**

➔ **Load Failsafe Defaults**

Use the **Load Failsafe Defaults** option to load failsafe default values for each of the parameters on the Setup menus. **F8 key can be used for this operation.**

Chapter

7

Software Drivers

7.1 Available Software Drivers

NOTE:

The content of the CD may vary throughout the life cycle of the product and is subject to change without prior notice. Visit the IEI website or contact technical support for the latest updates.

The following drivers can be installed on the system:

- Chipset
- VGA
- LAN
- Audio

Installation instructions are given below.

7.2 Starting the Driver Program

To access the driver installation programs, please do the following.

Step 1: Insert the CD-ROM that came with the system into a CD-ROM drive attached to the system.

Step 2: The screen in Figure 7-1 appears.

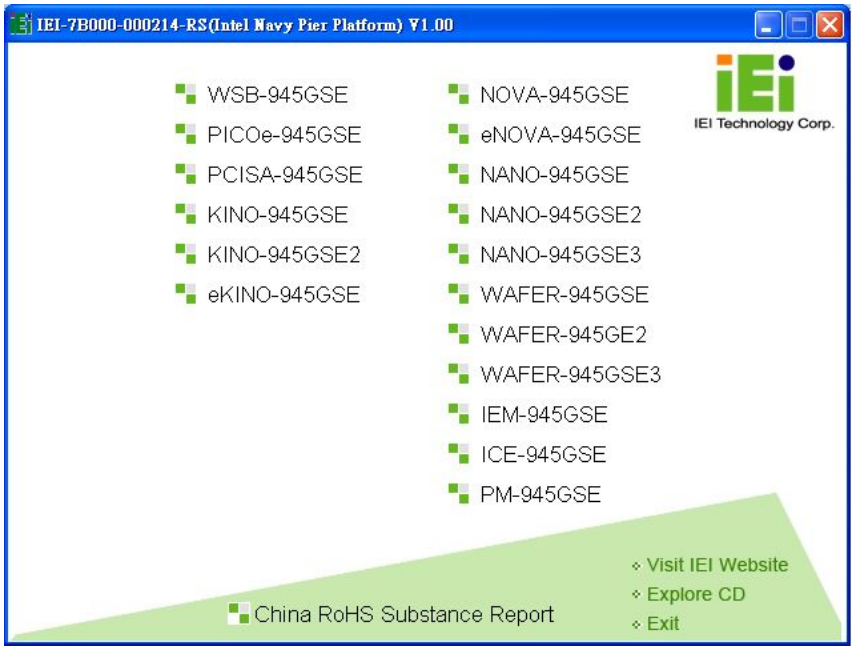


Figure 7-1: Start Up Screen

Step 3: Click **WAFER-945GSE**.

Step 4: The screen in appears.

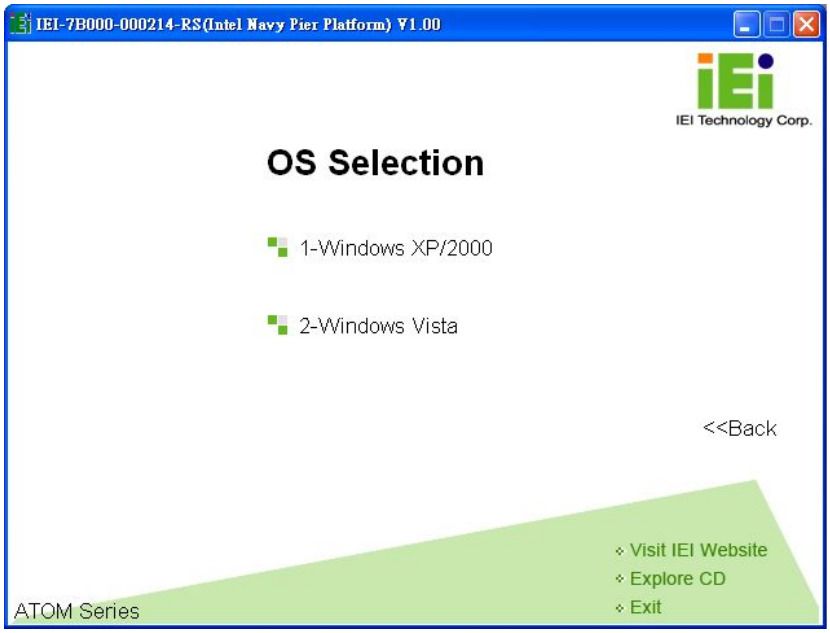


Figure 7-2: Select Operating System

Step 5: Select the operating system installed on the WAFER-945GSE system. This

manual describes the installation for a **Windows XP** operating system.

Step 6: The list of drivers in Figure 7-3 appears.**Step 0:**

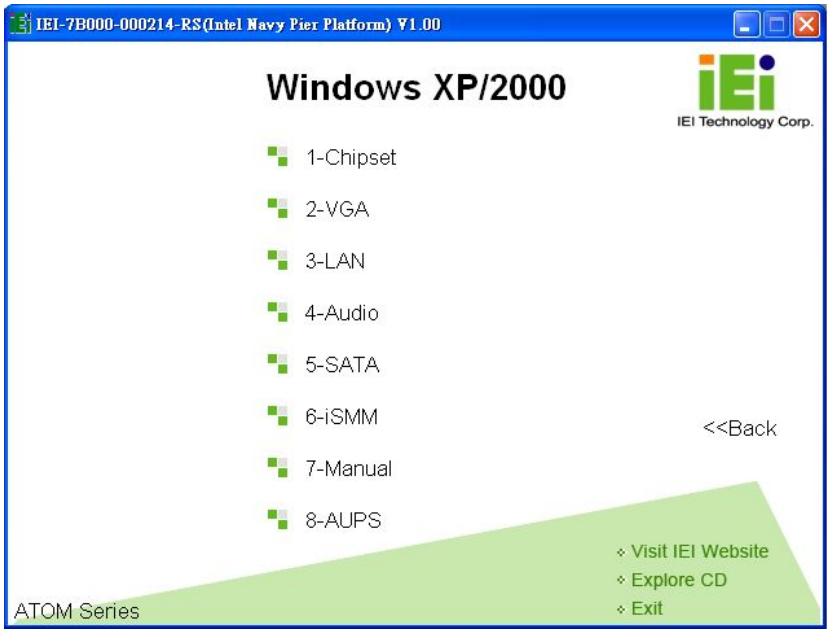


Figure 7-3: Drivers

7.3 Chipset Driver Installation

To install the chipset driver, please do the following.

Step 1: Access the driver list shown in Figure 7-3. (See **Section 7.2**)

Step 2: Click “**1-Chipset Driver**”

Step 3: The setup files are extracted as shown in Figure 7-4.

Figure 7-4: Chipset Driver Screen

Step 4: When the setup files are completely extracted the **Welcome Screen** in Figure 7-5 appears.

Figure 7-5: Chipset Driver Welcome Screen

Step 5: Click **Next** to continue.

Step 6: The license agreement in Figure 7-6 appears.

Step 7: Read the **License Agreement**.

Step 8: Click the **Yes** icon to continue.

Figure 7-6: Chipset Driver License Agreement

Step 9: The Read Me file in Figure 7-7 appears.

Step 10: Click **Next** to continue.

Figure 7-7: Chipset Driver Read Me File

Step 11: **Setup Operations** are performed as shown in Figure 7-8.

Figure 7-8: Chipset Driver Setup Operations

Step 12: Once the **Setup Operations** are complete, click the **Next** icon to continue.

Step 13: The **Finish** screen appears.

Step 14: Select “**Yes, I want to restart the computer now**” and click the **Finish** icon.

See Figure 7-9.

Figure 7-9: Chipset Driver Installation Finish Screen

7.4 VGA Driver Installation

To install the VGA driver, please do the following.

Step 1: Access the driver list shown in Figure 7-3. (See **Section 7.2**)

Step 2: Click “**2-VGA**”

Step 3: The VGA Read Me file in Figure 7-10 appears.

Step 4: Click **Next** to continue.

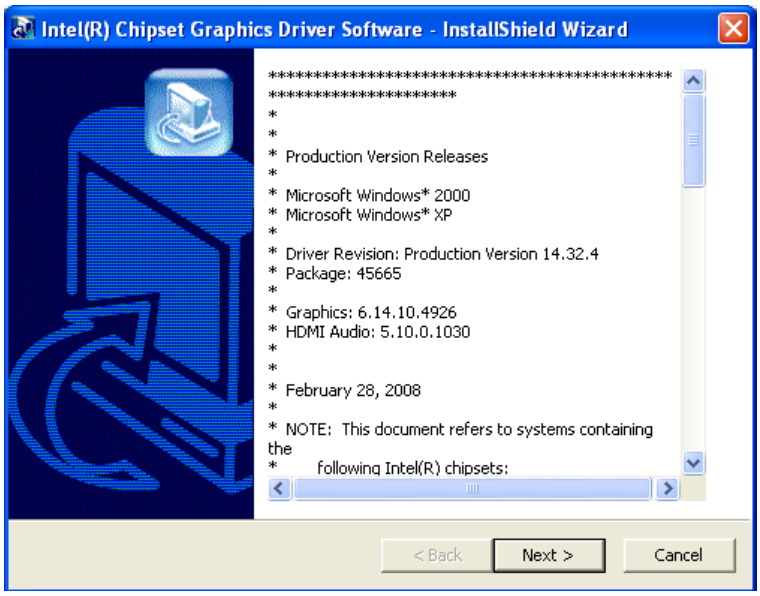


Figure 7-10: VGA Driver Read Me File

Step 5: The installation files are extracted. See Figure 7-11.

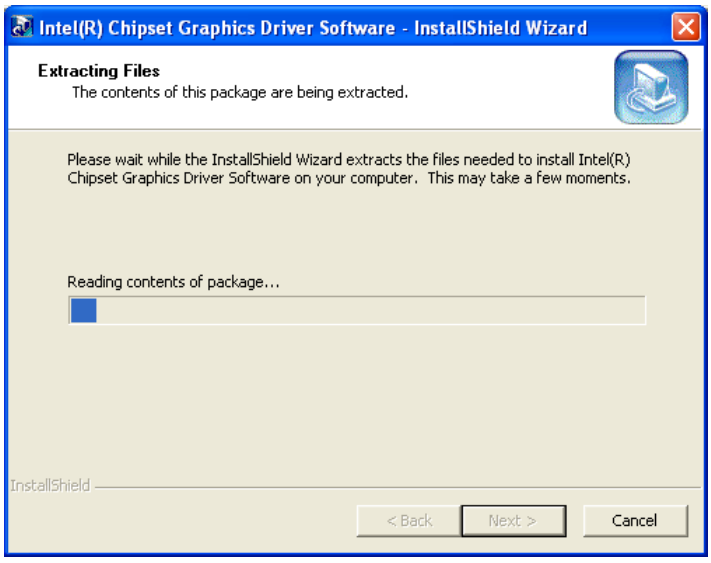


Figure 7-11: VGA Driver Setup Files Extracted

Step 6: The **Welcome Screen** in Figure 7-12 appears.

Figure 7-12: VGA Driver Welcome Screen

Step 7: Click **Next** to continue.

Step 8: The license agreement in Figure 7-13 appears.

Step 9: Read the **License Agreement**.

Step 10: Click the **Yes** icon to continue.

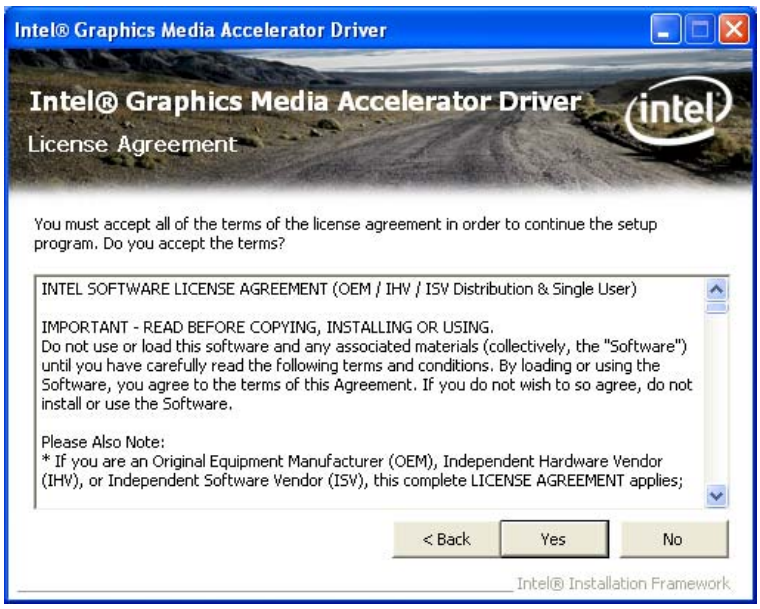


Figure 7-13: VGA Driver License Agreement

Step 11: The Read Me file in Figure 7-14 appears.

Step 12: Click **Next** to continue.

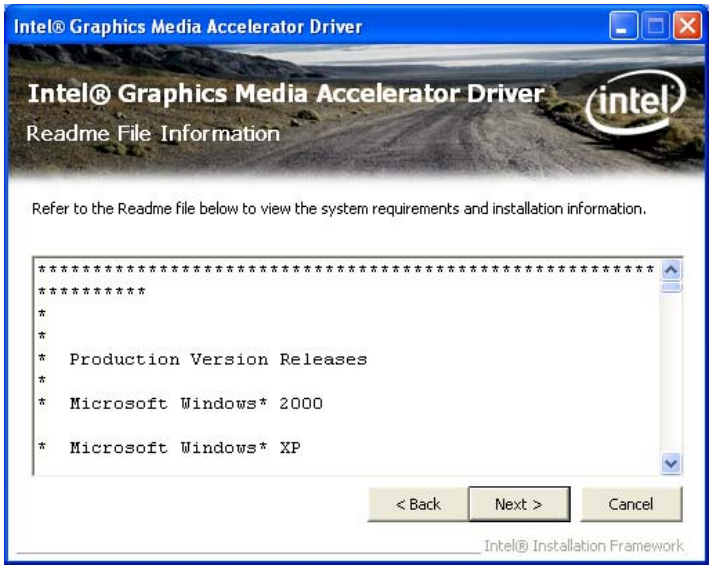


Figure 7-14: VGA Driver Read Me File

Step 13: **Setup Operations** are performed as shown in Figure 7-15.

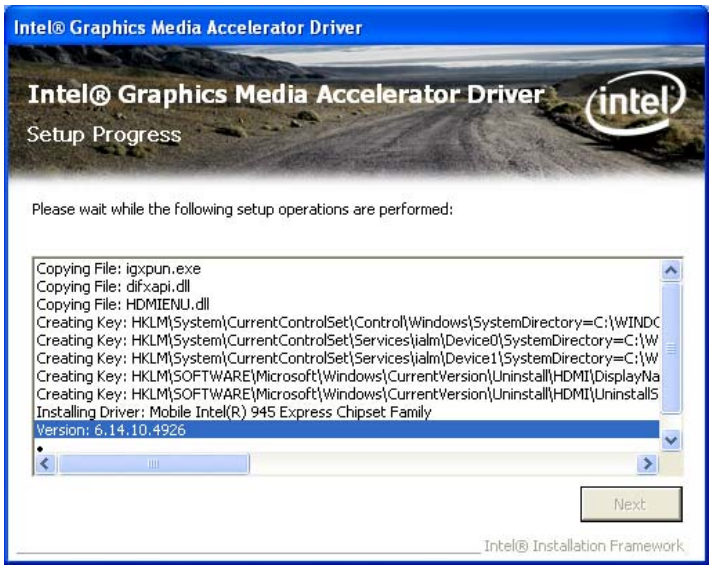


Figure 7-15: VGA Driver Setup Operations

Step 14: Once the **Setup Operations** are complete, click the **Next** icon to continue.

Step 15: The **Finish** screen appears.

Step 16: Select “**Yes, I want to restart the computer now**” and click the **Finish** icon.

See Figure 7-16.**Step 0:**

Figure 7-16: VGA Driver Installation Finish Screen

7.5 LAN Driver Installation

To install the chipset driver, please do the following.

Step 1: Access the driver list shown in Figure 7-3. (See **Section 7.2**)

Step 2: Click “**3-LAN**”

Step 3: The **Welcome** screen in Figure 7-17 appears.

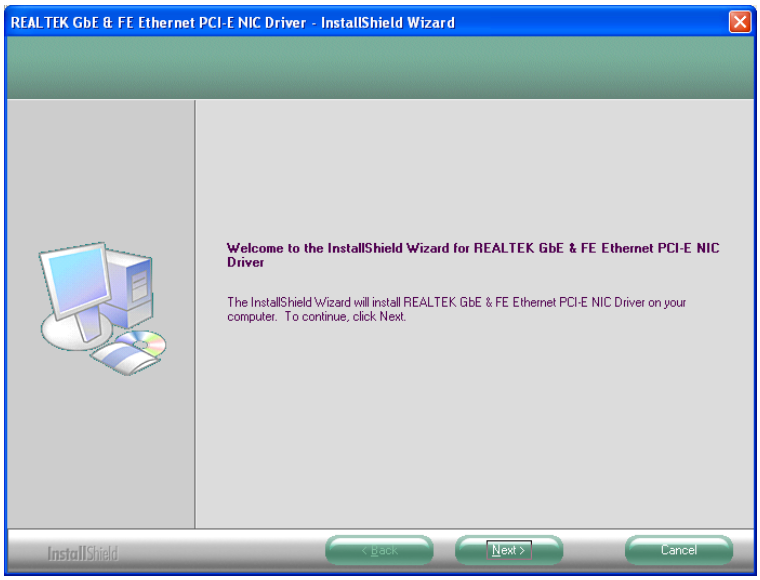


Figure 7-17: LAN Driver Welcome Screen

Step 4: Click **Next** to continue.

Step 5: The **Ready to Install** screen in Figure 7-18 appears.

Step 6: Click **Next** to proceed with the installation.

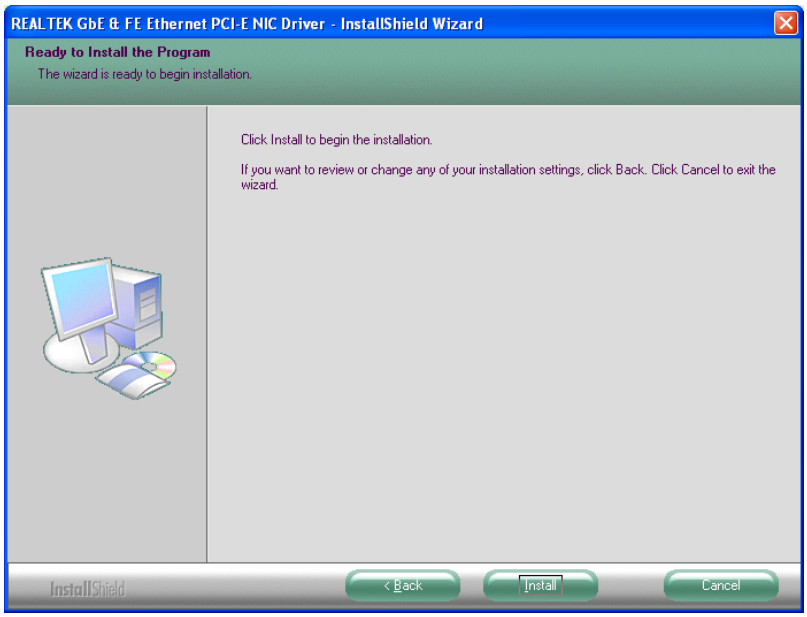


Figure 7-18: LAN Driver Welcome Screen

Step 7: The program begins to install.

Step 8: The installation progress can be monitored in the progress bar shown in Figure 7-19.

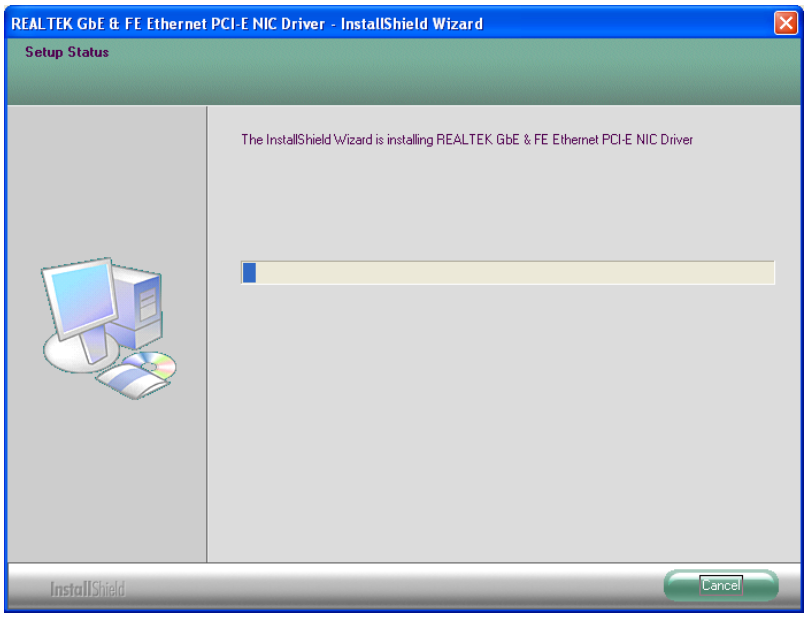


Figure 7-19: LAN Driver Installation

Step 9: When the driver installation is complete, the screen in Figure 7-20 appears.

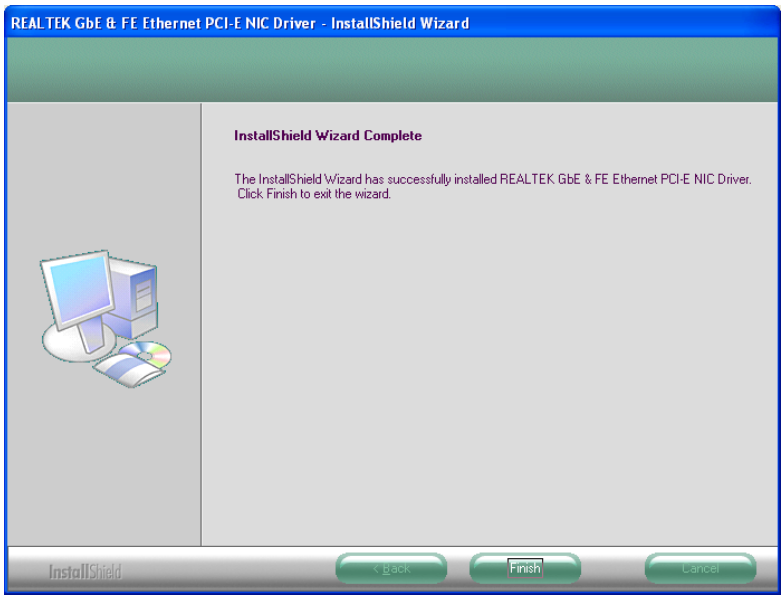


Figure 7-20: LAN Driver Installation Complete

7.6 Audio Driver Installation

To install the chipset driver, please do the following.

Step 1: Access the driver list shown in Figure 7-3. (See **Section 7.2**)

Step 2: Click “**4-Audio**”

Step 3: The screen in Figure 7-21 appears

WARNING:

The WAFER-945GSE does not support HD Audio. Please do not install the HD Audio driver onto the WAFER-945GSE.

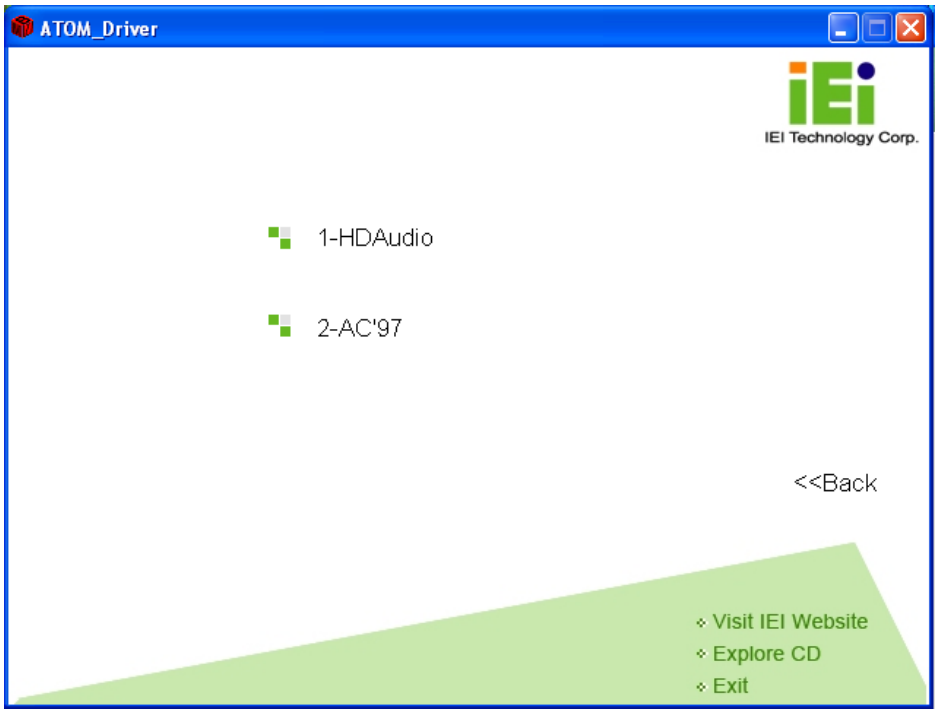


Figure 7-21: Audio Driver Options

Step 4: Select “**2-AC’97**” in Figure 7-21

Step 5: The installation files are extracted as shown in Figure 7-22.

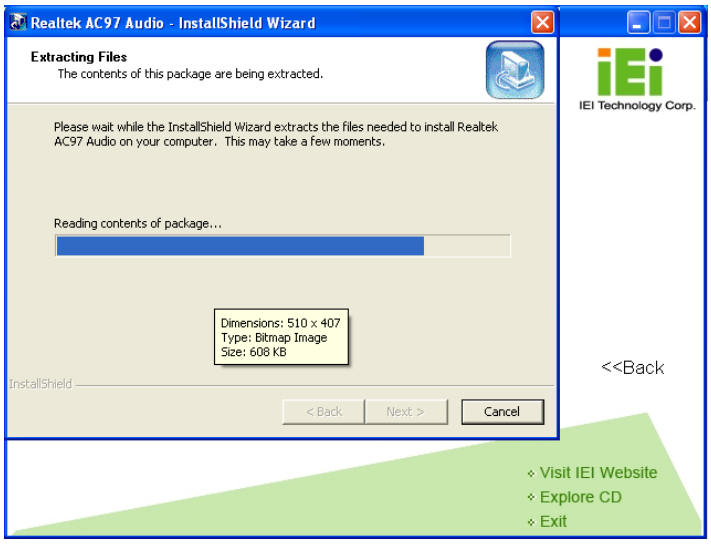


Figure 7-22: AC’97 Driver Installation File Extraction

Step 6: The AC’97 Driver Installation screen in Figure 7-23 appears.

Step 7: Click **Next** to continue.

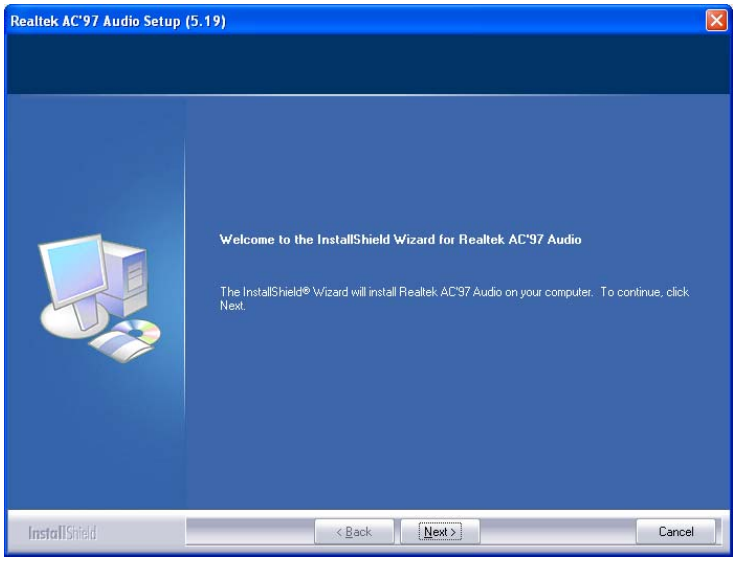


Figure 7-23: AC’97 Driver Installation Welcome Screen

Step 8: The Verification window in Figure 7-24 may appear.

Step 9: Click “**Continue Anyway**.”

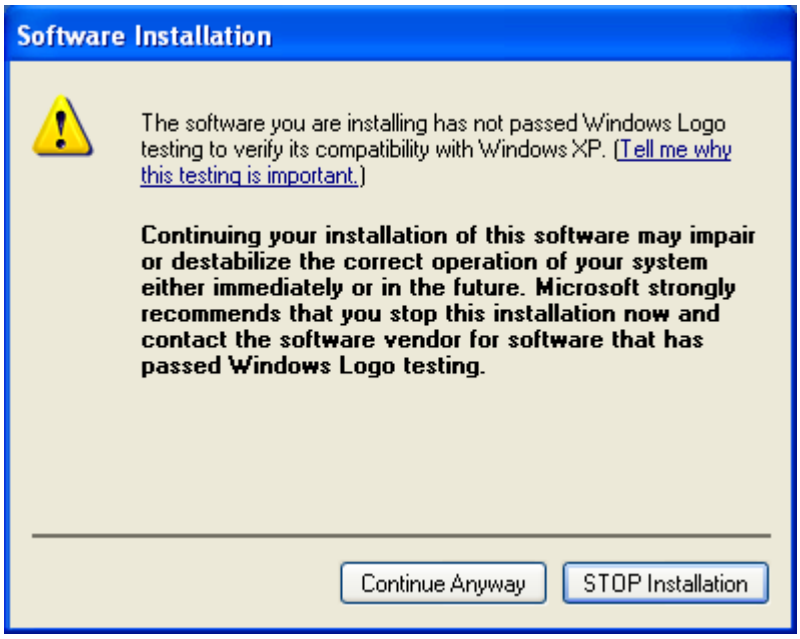


Figure 7-24: AC’97 Driver Installation Verification

Step 10: The driver installation begins. See Figure 7-25.

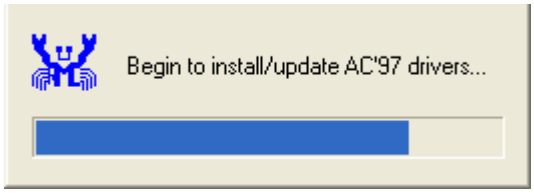


Figure 7-25: AC’97 Driver Installation

Step 11: When the driver is installed, the driver installation finish screen in Figure 7-26 appears.

Step 12: Select “**Yes, I wish to restart my computer now**” And click **Finish**

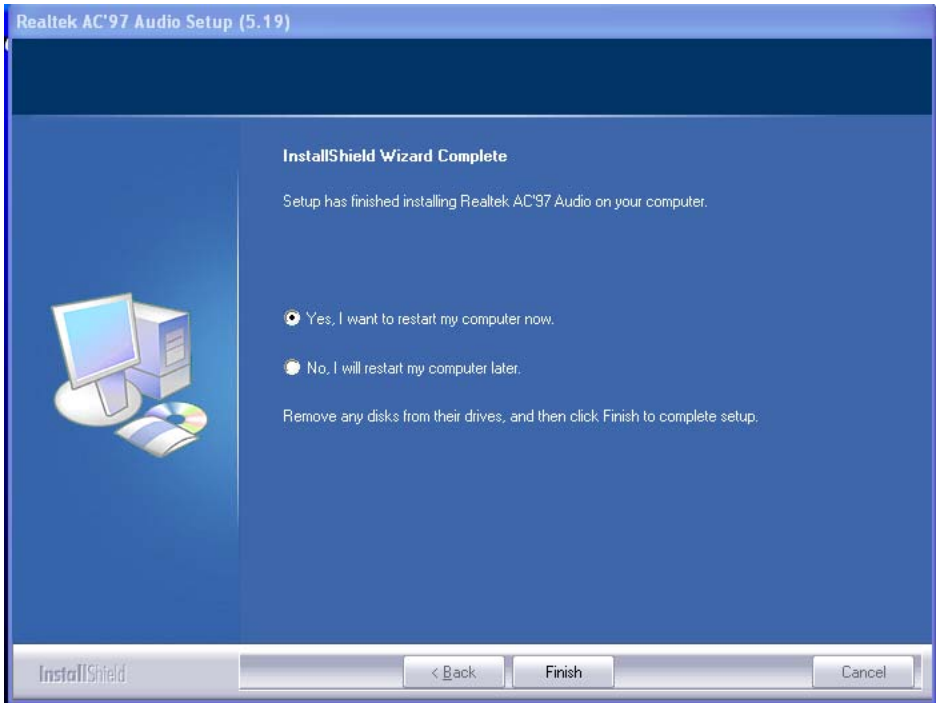


Figure 7-26: AC’97 Driver Installation Complete

Step 13: The system reboots.

Appendix

A

BIOS Menu Options

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- IDE Master and IDE Slave 102
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- Serial Port3 Address [3E8] 109
- Serial Port3 IRQ [11] 109
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- Terminal Type 122
- VT-UTF8 Combo Key Support 122
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- Load Failsafe Defaults 140

Appendix

B

Terminology

AC ’97	Audio Codec 97 (AC’97) refers to a codec standard developed by Intel® in 1997.
ACPI	Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.
AHCI	Advanced Host Controller Interface (AHCI) is a SATA Host controller register-level interface.
ATA	The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.
APM	The Advanced Power Management (APM) application program interface (API) enables the inclusion of power management in the BIOS.
ARMD	An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.
ASKIR	Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude (“volume”) of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.
BIOS	The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user
CODEC	The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.
CMOS	Complimentary metal-oxide-conductor is a type of integrated circuit used in chips like static RAM and microprocessors.
COM	COM is used to refer to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal

	computer is usually a male DE-9 connector.
DAC	The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.
DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
FSB	The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.
GbE	Gigabit Ethernet (GbE) is an Ethernet version that transfers data at 1.0 Gbps and complies with the IEEE 802.3-2005 standard.
GPIO	General purpose input
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.

MAC	The Media Access Control (MAC) protocol enables several terminals or network nodes to communicate in a LAN, or other multipoint networks.
PCIe	PCI Express (PCIe) is a communications bus that uses dual data lines for full-duplex (two-way) serial (point-to-point) communications between the SBC components and/or expansion cards and the SBC chipsets. Each line has a 2.5 Gbps data transmission rate and a 250 MBps sustained data transfer rate.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
QVGA	Quarter Video Graphics Array (QVGA) refers to a display with a resolution of 320 x 240 pixels.
RAID	Redundant Array of Inexpensive Disks (RAID) refers to redundantly backing up data on multiple disks to ensure that if one disk fails, the data is not lost and can be restored from the remaining disks in the array.
RAM	Random Access Memory (RAM) is a form of storage used in computer. RAM is volatile memory, so it loses its data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gbps and the SATA II bus has data transfer speeds of up to 3.0 Gbps.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for

	asynchronous communications on the system and manages the system’s serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.
USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12Mbps data transfer rates, while USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

C

DIO Interface

C.1 DIO Interface Introduction

The DIO connector on the WAFER-945GSE is interfaced to GPIO ports on the ITE IT8718F Super I/O chipset. The DIO has both 4-bit digital inputs and 4-bit digital outputs. The digital inputs and digital outputs are generally control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.

NOTE:

For further information, please refer to the datasheet for the ITE IT8718F Super I/O chipset.

C.2 DIO Connector Pinouts

The following table describes how the DIO connector pins are connected to the Super I/O GPIO port.

Pin	Description	Super I/O Pin	Super I/O Pin Description
1	Ground	N/A	N/A
2	VCC	N/A	N/A
3	Output 3	GP23	General Purpose I/O Port 2 Bit 3
4	Output 2	GP22	General Purpose I/O Port 2 Bit 2
5	Output 1	GP21	General Purpose I/O Port 2 Bit 1
6	Output 0	GP20	General Purpose I/O Port 2 Bit 0
7	Input 3	GP33	General Purpose I/O 33
8	Input 2	GP32	General Purpose I/O 32
9	Input 1	GP31	General Purpose I/O 31
10	Input 0	GP30	General Purpose I/O 30

C.3 Assembly Language Samples

C.3.1 Enable the DIO Input Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O input functions is listed below.

```
MOV     AX, 6F08H     Sets the digital port as input
INT     15H           Initiates the INT 15H BIOS call
```

C.3.2 Enable the DIO Output Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O output functions is listed below.

```
MOV     AX, 6F09H     Sets the digital port as output
MOV     BL, 09H
INT     15H           Initiates the INT 15H BIOS call
```

Appendix

D

Watchdog Timer

NOTE:

The following discussion applies to DOS environment. IEI support is contacted or the IEI website visited for specific drivers for more sophisticated operating systems, e.g., Windows and Linux.

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

A BIOS function call (INT 15H) is used to control the Watchdog Timer:

INT 15H:

AH – 6FH Sub-function:	
AL – 2:	Sets the Watchdog Timer’s period.
BL:	Time-out value (Its unit-second is dependent on the item “Watchdog Timer unit select” in CMOS setup).

Table D-1: AH-6FH Sub-function

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. While the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the Watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

NOTE:

When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system resets.

Example program:

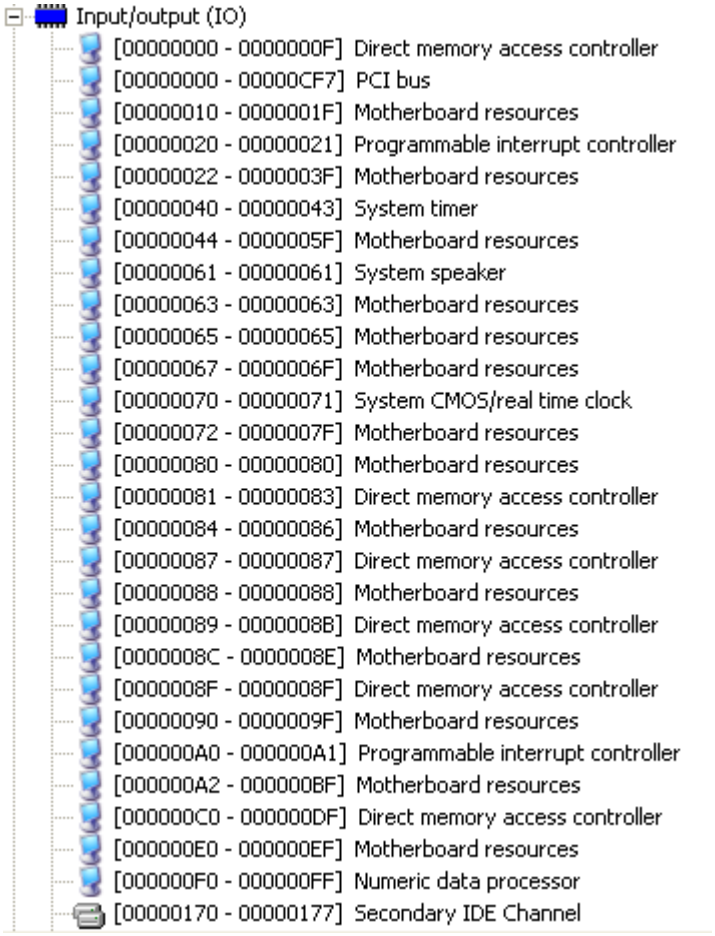
```
; INITIAL TIMER PERIOD COUNTER
;
W_LOOP:

        MOV     AX, 6F02H       ;setting the time-out value
        MOV     BL, 30                  ;time-out value is 48 seconds
        INT      15H
 ;
; ADD THE APPLICATION PROGRAM HERE
;
        CMP      EXIT_AP, 1             ;is the application over?
        JNE       W_LOOP        ;No, restart the application

        MOV     AX, 6F02H       ;disable Watchdog Timer
        MOV     BL, 0           ;
        INT      15H
;
; EXIT ;
```

Appendix

E

Address Mapping

E.1 I/O Address Map



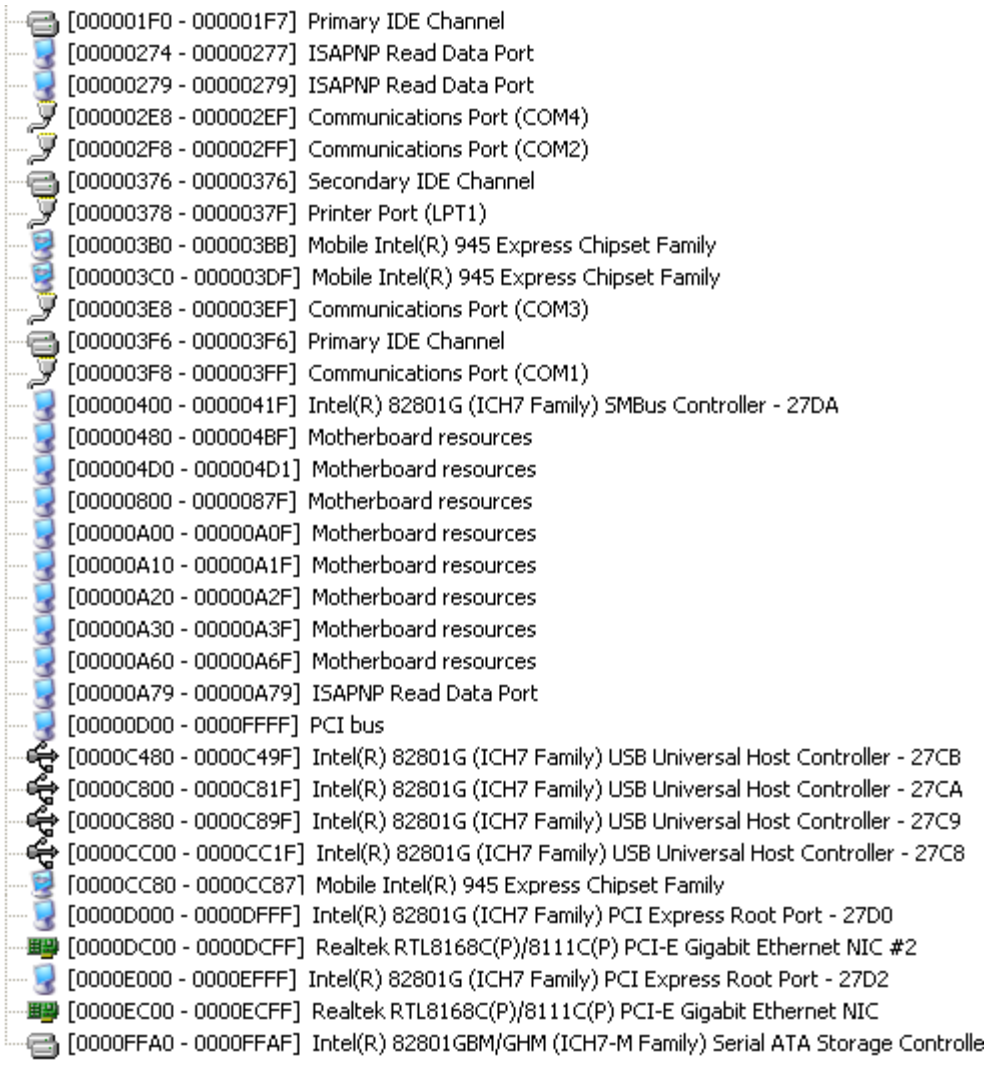


Table E-1: IO Address Map

E.2 IRQ Address Map

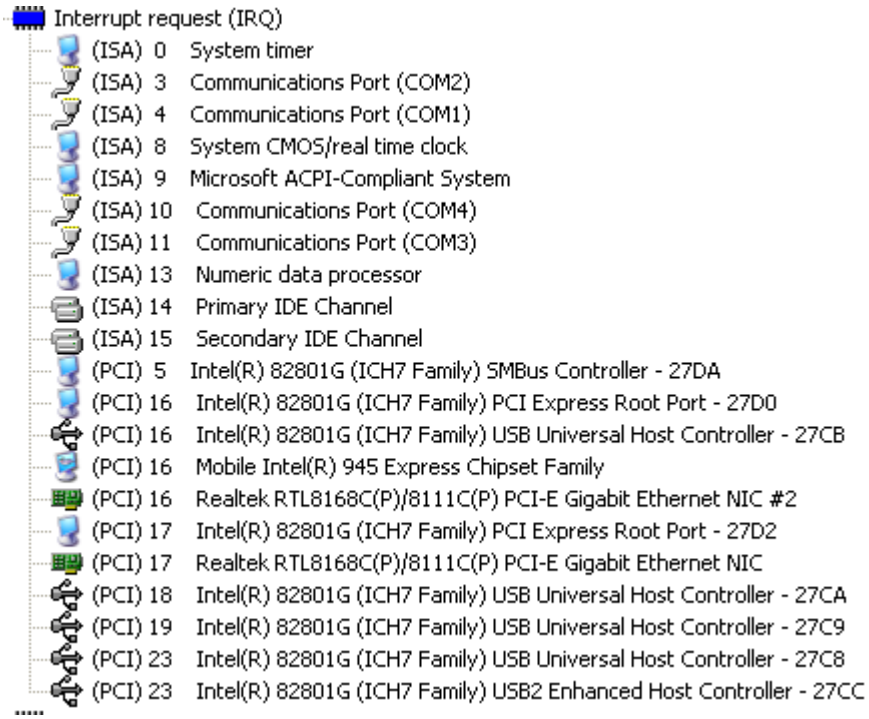


Table E-2: IRQ Address Map

E.3 Memory Address Map

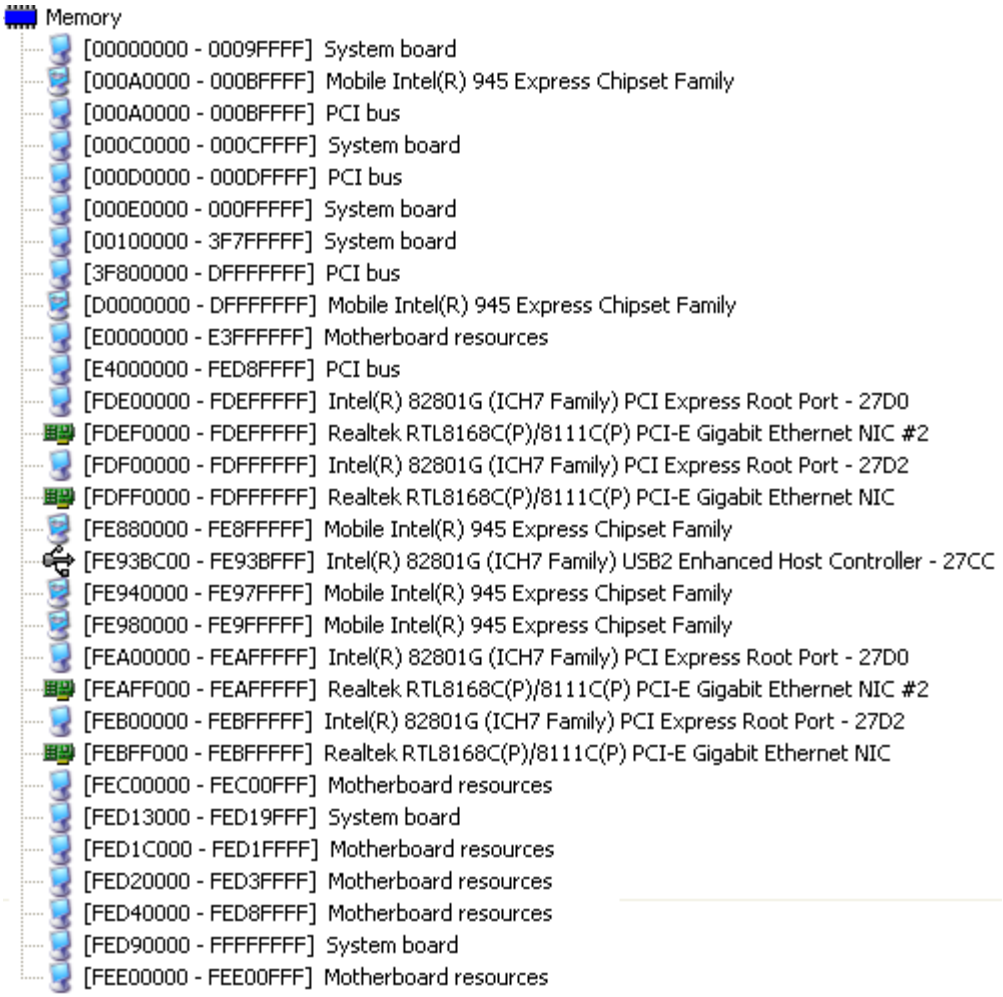


Table E-3: Memory Address Map

Appendix

F

Hazardous Materials Disclosure

F.1 Hazardous Material Disclosure Table for IPB Products Certified as RoHS Compliant Under 2002/95/EC Without Mercury

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated “Environmentally Friendly Use Period” (EFUP). This is an estimate of the number of years that these substances would “not leak out or undergo abrupt change.” This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the table on the next page.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	x	O	O	O	O	x
Display	X	O	O	O	O	X
Printed Circuit Board	X	O	O	O	O	X
Metal Fasteners	X	O	O	O	O	O
Cable Assembly	X	O	O	O	O	X
Fan Assembly	X	O	O	O	O	X
Power Supply Assemblies	X	O	O	O	O	X
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有”环境友好使用期限”的标签，此期限是估算这些物质”不会有泄漏或突变”的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	X	O	O	O	O	X
显示	X	O	O	O	O	X
印刷电路板	X	O	O	O	O	X
金属螺帽	X	O	O	O	O	O
电缆组装	X	O	O	O	O	X
风扇组装	X	O	O	O	O	X
电力供应组装	X	O	O	O	O	X
电池	O	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。